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Part I.

Original Contributions.

ON THE REMOVAL OF CATARACT BY THE SCOOP-METHOD, OR THE METHOD BY TRACTION

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It is admitted by modern opthalmologists that cataract occurring in persons who have passed the middle period of life should be removed or extracted. It is only in very rare and exceptional cases that either solution or depression are now had recourse to. The operation that is usually performed in extracting a cataract is the flap operation, "extraction à lambeau," as it is termed by the French. It is so well-known to all ophthalmic surgeons that I need not describe the different steps of the operation. It has been extensively adopted both in this country and abroad for many years. It requires

considerable dexterity, but when skilfully performed it gives a considerable average of success, and in some cases the results are very brilliant. Until very recently this operation has been universally adopted, and even now its claims to superiority are maintained by many of the highest authorities. All, however, who have had extensive experience and have carefully observed the results in numerous cases must come to the conclusion that a considerable percentage are tedious and protracted in recovering, leaving imperfect sight in many, and loss of sight in some instances. It becomes a very interesting subject of enquiry as to whether there is any safer method of removing a cataract. Previous to entering upon the consideration of this point, and with a view to a further elucidation of the subject, it is desirable to consider the more common causes of partial or complete failure in flap extraction. The size and shape of the corneal wound endanger the vitality of the corneal flap, risk the accurate adaptation of the edges of the large semi-circular wound, and deprive the globe of all support. So that any straining or pressure on the eye, or sudden movement, are liable to separate the edges of the wound and produce prolapse of the iris to a greater or less extent, a result which leads to a very protracted and tedious process of repair, involving much anxiety and suffering, and more or less serious impairment or entire loss of vision. The want of perfect adaptation of the corneal flap, the facility with which its edges may be separated from each other, either spontaneously or by the interposition of some little foreign body, such as blood or particles of lens matter, predispose to suppurative instead of adhesive inflammation of the corneal wound. This tragic sequel to the operation is usually ascribed to constitutional causes. Cases however not unfrequently occur that suggest, in some instances, a local origin. Both eyes are sometimes operated on at the same time and apparently, with equal skill, in one eye good union occurs, in the other suppuration of the globe. In such instances some local cause must have determined the result. Surely these examples, which are by no means of

infrequent occurrence, are highly suggestive; they prove that success or failure is determined by very slight and almost inappreciable modifications in the operation, and encourage a careful consideration of all the possible local conditions that may interfere with, retard, or prevent union.

In addition to these possible casualties the surface of the iris is liable to be pressed upon and bruised by the knife in completing the section, even when it is used with the utmost dexterity, and this structure seems to resent even the slightest injury; and to this we may add that the undue stretching of the pupil during the transit of a bulky hard lens is a further and unavoidable cause of offence to the iris, and predisposes to troublesome iritis and closed pupil, conditions which involve serious complications and very much interfere with ultimate success. Finally, the loss of vitreous humour is apt to occur in the flap operation, and, owing to the large, gaping wound and the absence of all support to the globe, is apt to be extensive, and to render the result less satisfactory. The after treatment of flap extraction involves a state of prolonged repose in a darkened room, and very tedious restrictions upon the usual habits and occupations of the patient. Involuntary action of the orbicularis may produce prolapse. It may also be mentioned, incidentally, that however nervous and irritable the patient may be, and however desirable it may seem on many accounts to administer chloroform, it is a very risky proceeding in this operation, on account of the tendency to violent retching. It may be well in the next place to consider how far those various sources of danger and failure can be avoided without incurring others to an equal degree. The indications for the performance of a safe operation or rather an operation in which the elements of safety are most completely fulfilled may be stated as follows: to avoid as much as possible all the rocks upon which we may be said to split in the flap operation; thus the opening in the cornea should partake rather of the character of a slightly curvilinear slit than a semicircular flap, but it should be of sufficient size to

admit the ready exit of the lens when gently drawn out by means of a suitable spoon. In the next place a portion of the iris should be removed so as to facilitate the exit of the cataract, prevent the possibility of prolapse, and diminish the liability to iritis and closed pupil. In the last place we must endeavour to remove the entire cataract, leaving no fragments behind, without, at the same time, bruising the iris or contusing the edges of the wound, and without rupturing the hyaloid membrane. If these indications have been carefully and efficiently carried out, every condition for obtaining a successful issue has been fulfilled, and the happiest result may be legitimately expected. Previous to describing the operation that is now adopted in a large majority of cases by some of my colleagues and myself at the Moorfields Hospital, and which I may state as one of the main objects of the present paper, I will endeavour to trace the various steps by which the operation has been brought to what I will venture to call its present advanced stage towards perfection. In the writings of Professor Graefe we find frequent allusion to the removal of a portion of iris as a desirable precaution in certain cataract operations. Thus in linear extraction, which was initiated almost simultaneously by Mr. Bowman in this country, and by the Berlin professor, the latter advises a removal of a portion of the iris in some cases as giving additional chances of success. In cataract complicated with old pupillary adhesions, he advises iridectomy previous to flap extraction. More recently he advised, in certain ordinary cases of flap extraction, that an iridectomy be performed some weeks previously, and still more recently he recommended that linear extraction should be applied to cataracts of medium density by introducing certain modifications into the operation, and he removed in this way, with a scoop, cataracts through a large linear opening, an iridectomy having been also performed. Having thus given an impetus to this important modification of the old method of flap extraction, the idea has been worked out in different

ways by some of the more distinguished of his pupils on the continent, and also at the Moorfields Hospital by Mr. Bowman and myself. Thus Dr. Mooren took up the plan of performing a previous iridectomy, and then, at the end of five or six weeks, performed the ordinary flap extraction, he published a large number of successful cases, and urged the plan as meriting universal adoption, and it is now associated with his name. Professor Jacobson combined the ordinary flap extraction with an iridectomy performed at the same time; in a similar way he supported his claims by a large array of successful cases, and his name remains attached to the method; and Professor Schuft (Waldau) worked out more fully the modified linear extraction, suggested a peculiar form of spoon, and published a paper in which the various stages of the operation are fully described, and the method supported by the citation of numerous successful cases. Thus there suddenly appeared three new methods of operating for cataract, bearing the names of their several champions,—the method of Mooren, that of Jacobson, and that of Schuft (Waldau); but justice compels me to state that these gentlemen lighted their tapers at the torch of their great master, Professor Graefe. Each of these methods had been previously suggested and practised by him, but only in exceptional cases instead of as a general rule. It does not come within the scope of this paper to enter analytically into the respective merits of those three methods. The title of the paper by implication shews my bias in favour of scoop extraction; it seems to me desirable to avoid the formation of a large flap wound of the cornea, the disadvantages are obvious, and have been already alluded to in this paper; the only advantage to be placed on the other side of the question is the ready escape of the cataract, and if this can be accomplished as well through a curvilinear opening, as I have already said, there seems to me that a considerable advantage is gained. Soon after the publication of Schuft's (Waldau's) pamphlet, the operation was put upon its trial at Moorfields, both by Mr. Bowman, myself, and others, and from that

time until the present, with certain modifications, we have continued to perform it in an increasing proportion of cases, and during the last year I have exclusively performed scoop extractions. The operation performed at the present time by myself and that by Mr. Bowman differs somewhat, both in the mode of performance and in some of the instruments employed; I shall however confine my remarks to my own method of performing, and to a description of the scoop that I employ, and I have reason to believe that Mr. Bowman will add some remarks upon his method of proceeding, and his views as to the comparative value of the operations; remarks, I need hardly say, that must be most interesting and welcome to every ophthalmic surgeon. I find on reference to my note-book that I performed my first extraction with Schuft's (Waldau's) spoon on the 17th July, 1860, at the Moorfields Hospital, and I continued to employ it until February, 1864, when I began to use the scoop that I now employ, and that is figured in this paper. My first few cases happened to be very successful, but as my experience increased I was less fortunate; I became more and more convinced that success depended upon great attention to the small details. I also became convinced that the spoon I was employing was seriously defective in form; owing to its broad, thick frontage and to the sharply defined edge of its dish-like cavity, it was difficult to introduce and to insinuate behind the lens. The sharp edge had also a tendency to break up the lens into fragments, and to force some of these into the space behind the iris, where they remain fixed for a time and then become washed into the pupil, or on the anterior surface of the iris, or into the wound and set up serious reaction. Again, the edges of the spoon are very liable to bruise the iris and the edges of the wound, and in cases of hard senile cataract it was all but impossible to insinuate it behind the lens without displacing it, and risking a rupture of the hyaloid membrane, and even if this were accomplished, the bulk of the spoon, and the space that it occupied, added seriously to the difficulty of bringing the

Instruments used in Traction Operation for Cataract.

PLATE I.

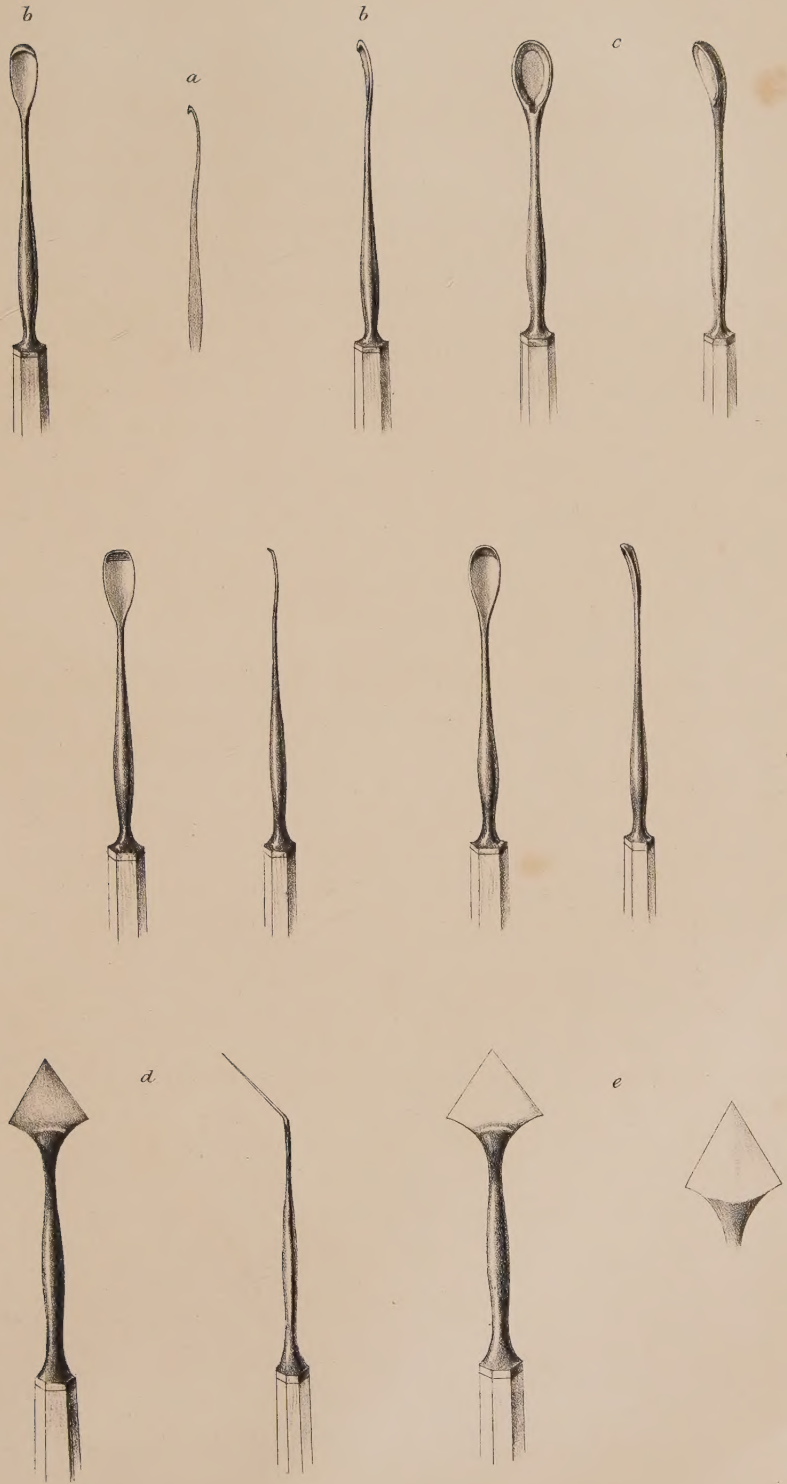
b b.—Form of Spoon employed by Mr. Critchett.

a.—Section of the same to show the recurved lip.

c.—Waldan's Spoon of the original size and pattern, shewing the depth of the edge.

The four Instruments delineated in the middle of the Plate are other modifications as employed by Mr. Bowman.

d & e.—Spear-shaped Knife (Keratame) used for making the corneal incision, of different sizes, seen on the flat and in profile.



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lens out through the corneal wound. The result was that some unfavourable cases occurred, and by degrees the operation fell into discredit, particularly on the continent, and was quite given up by several who were disposed at first to adopt it. This was partly to be attributed to defects in the instrument employed, and partly to errors in the mode of conducting the operation,—errors that must necessarily arise in every new proceeding in which the details are not fully understood, and for which a special manual dexterity has not been as yet acquired; some fresh education being necessary even for those who were previously dexterous operators. Some of my cases, however, had made such a rapid recovery, had obtained such excellent sight, and had given me so little trouble and anxiety, that I became strongly impressed in favour of the operation. I was convinced that by carefully studying all the details of the operation, by making some alteration in the instruments used, and by avoiding the elements of failure, such as bruising and contusing either the iris or the edges of the wound, leaving fragments of the cataract still within the eye or in the wound, or rupturing the hyaloid membrane, better averages might be obtained and a more rapid recovery be brought about than in flap extraction. I was also convinced that it might be made applicable to every form of cataract for which flap extraction can be employed, including the hard amber senile cataract. Previous to describing the various steps of the operation it may be well to point out in what essential particulars flap extraction and the scoop method differ, and what are the principles and ideas that guide us in the various steps we take, and in the form of the instruments we employ. In flap extraction the idea is to make such an opening in the cornea as will allow the cataract readily to escape through it, either spontaneously or when gentle pressure is made on the globe. In the scoop extraction the idea is to make a wound of such a size and shape as will permit the transit of the cataract, but will not open so as to allow of its spontaneous escape, requiring for this purpose the use of an instrument

to draw the cataract through the opening. This necessitates the employment of a suitable cutting instrument in order to make a corneal incision of the requisite curvilinear form; and, furthermore, a scoop, of such a form as will glide readily behind the lens between its posterior surface and the hyaloid membrane, will occupy little space, will adapt its concave surface to the convex posterior surface of the lens, and on its withdrawal will so possess itself of the lens as to bring it out through the corneal opening, the edges of which are thus mechanically opened to allow of its exit. Hence it will be seen that although the escape of the cataract may be attended with more difficulty than in the flap extraction, when it is once accomplished the parts are left in a much more secure state, and the prospects of a speedy and complete healing of the wound are greater. I will now proceed to describe the various steps of the operation.

It is one of the advantages of the method of proceeding I am about to describe that chloroform can be given with safety. I usually employ it, because a perfectly quiescent state of the eye and the absence of all spasm and involuntary squeezing together of the lids materially promotes a satisfactory performance of the different steps of the operation. Nevertheless, I have frequently operated without it, and with excellent success. In deciding this point I am partly influenced by the wishes of the patient and partly by the estimate I form of their probable behaviour. In forming an opinion on this latter point I am guided by various considerations, such as the strength of the orbicularis muscle, and the degree of irritability in the conjunctival membrane. This I usually test by gently manipulating the eye, touching the surface, straining open the lids, &c. It will thus be found that the sensitiveness of patients differs to a remarkable degree. A very correct estimate may in this way be formed of the probable behaviour of the patient during the operation, and I am very much guided by it in determining whether chloroform should be given or not. As a rule, however, I think that the various steps of the operation can be

more completely and safely carried out, and that the chances of accidents and unfavourable complications can be best avoided by the administration of chloroform, and, therefore, I usually advise it. The first step of the operation is to open the lids fully with a wire speculum so constructed as to fix at any definite point and regulate exactly the degree to which the eyelids are separated. The eye must be fixed, and its position determined accurately by means of a pair of tolerably strong forceps. In doing this it is not sufficient to seize the conjunctiva; this easily tears and gives way. It is better to include the subconjunctival fascia, and even the insertion of one or other of the recti muscles, this enables you to take a firm hold and to fix the eye in any position that may be most favourable for the performance of the subsequent steps of the operation. The eye being well fixed, the next stage consists in making the opening in the cornea—the size, form, and position of this are important—the incision must be slightly curved, forming a small segment of a large circle, and corresponding both in size and form to the curvature of the anterior surface of the lens or cataract. When there is reason to believe, from the appearance of the cataract, that the nucleus only is hard and the circumference is comparatively soft, the extent of the incision may be more limited, but in the senile, hard amber cataract the incision must be of sufficient size to allow it to be drawn through entire. The incision must be made in the cornea about half a line from its junction with the sclerotic, and its extreme limits must trench slightly upon the junction of the sclerotic with the cornea in those cases requiring a sufficient opening for the removal of the entire lens. If the nucleus only is to be drawn out, a smaller opening will suffice, and this may be kept within the limits of the true corneal tissue. The direction of the incision is also important. I usually make it at the upper part of the cornea because the upper lid conceals the wound and the altered form of the pupil, but where this consideration has no force it is rather easier to operate at the outer part of the eye, and the result, as

regards vision, is equally good. In making the incision I employ the spear-shaped knife, curved at an angle on the flat, using rather a wider blade in those cases in which it is desirable to obtain a full-sized opening. The knife must be entered in the substance of the cornea, about half a line from its junction with the sclerotic, and must be carried across the anterior chamber up to the hilt, parallel to and just in front of the iris. This of course ensures an opening in the cornea equal to the width of the knife at its base or widest part, it also gives to the incision a slightly curvilinear form. If the incision is not of sufficient extent to allow of the ready exit of the cataract I sometimes enlarge it with a pair of fine, blunt-pointed scissors, preserving the direction of the curved line of incision. One of the most important points connected with the operation is the apportioning the size of the corneal opening to that of the cataract that has to be drawn through it. This is more especially the case in the hard amber cataract; serious embarrassment may occur if the corneal opening is not of sufficient size to allow the cataract readily to pass through it. Of course this apportionment can only be approximative, and no decided rule can be given, but with a little care and practice a very correct estimate may be formed. If, however, an error be committed, it is better to err on the side of having the opening too large than too small, as it is very undesirable to exert any force in drawing the cataract through the corneal opening. The next step in the operation is the removal of a portion of iris, for this purpose I employ a small pair of forceps bent at an angle, and with fine Assclini points. I usually remove only a small portion of iris; it seems to me to answer every purpose, and leaves less subsequent deformity of the pupil. A slight inconvenience that sometimes attends the cutting away a portion of the iris is the effusion of blood into the anterior chambers, obscuring the parts and impeding the subsequent stages of the operation. If, however, it is gently pressed out with the spoon of the curette before it has time to coagulate, it soon ceases. The next step in the operation consists in

PLATE II.

Fig. 1.—The position and extent of the incision in flap-extraction.

Fig. 2.—A Section of the Lens, indicating the size and form of a linear incision for spoon extraction.

Fig. 3.—A small section for spoon extraction.

Fig. 4.—A larger section for spoon extraction.

Fig. 5.—Shews the shape of the pupil after recovery, the upper eyelid being held up.

Fig. 6.—The same, when the eyelid is left to itself, and is allowed to cover the upper angle of the pupil so that the latter appears to be round.

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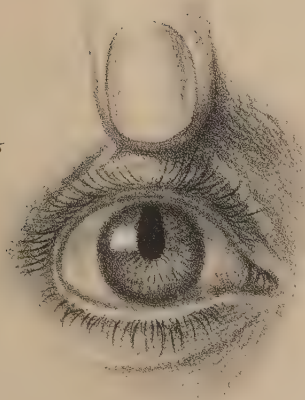

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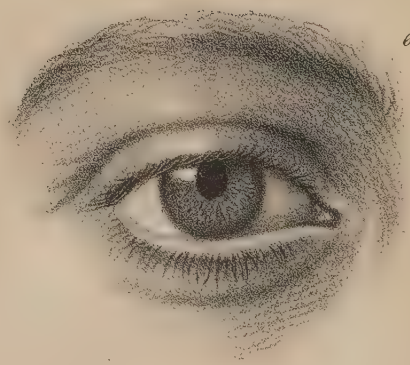

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opening the capsule, this is done in the same way and with the same instrument as in an ordinary flap extraction, it is however desirable that it should be freely torn through, with the two-fold object of preventing, if possible, the formation of a secondary or membranous cataract, and also to favour the advance of the cataract out of its vitreous bed. In doing this care must be taken not to press upon the anterior surface of the cataract so as to risk the rupture of the hyaloid membrane. The next and perhaps the most important stage is the removal of the cataract; for this purpose I employ a spoon or scoop, which I have already described and figured; it is so constructed as to glide readily behind the posterior surface of the cataract; it is thin, flat, and concave so as to adapt itself accurately to the posterior convex surface of the lens, and having passed completely behind it there is a small receding edge which holds the cataract, and as the scoop is gradually withdrawn brings the cataract out with it, or such nuclear portion of it as is of sufficient density to escape entire. This part of the proceeding requires considerable care and some dexterity. In the introduction of the spoon through the wound, the back must be pressed gently against the posterior part of the corneal slit, so as to depress it and bring it on a level with the edge of the cataract, the anterior part of the spoon must then be inclined backwards so as to glide along its posterior surface, making its way between that and the hyaloid membrane of the vitreous humour. This must be done slowly and carefully, watching the anterior surface to see if there is any displacement, or if the instrument is passing safely and easily along. When the scoop has reached the further edge of the cataract it may be gradually withdrawn, the receding border will fix itself in the substance of the lens and bring it out through the corneal opening, or such portion of it as possesses sufficient consistency to pass through entire. Just as it is escaping peculiar care is required, as this is the moment when the hyaloid membrane is most liable to give way and some of the vitreous humour to escape. We must

also avoid using any undue force or pressure, so that the surface of the iris and the margins of the wound may not be bruised or injured in any way. If (as may occur in those cases where the cataract is of the senile, hard, amber character) we find that it has escaped entire, the operation may be said to be completed; but if, as is more frequently the case, the nucleus only is drawn out, there is a residue of lenticular matter more or less considerable, varying in its consistence in different cases, and occupying not merely the pupil but the space between the iris and the hyaloid membrane, where portions are very apt to remain concealed. It is very desirable to remove these as far as possible from the eye, and for this purpose I employ, usually, a small spoon. When the pupil is cleared in this way, gentle pressure upon the front of the eye with the upper eyelid will often succeed in bringing fresh particles forward which may be removed in a similar way. It is important not to allow the spoon to touch the iris itself. I have not unfrequently observed that after every care has been taken to spoon away every particle of opaque lenticular matter, and the pupil looks perfectly clear and black, if a few hours are allowed to elapse and the aqueous humour reforms, the pupil will again be found filled with particles of the cataract. As this may became a source of irritation it may well admit of question whether it may not be desirable again to open the wound and remove these fragments. There are certain practical inconveniences attending this proceeding, but I can well conceive cases in which I should be disposed to adopt it. Great care is required not to leave any particle between the lips of the wound or so near the margin as to allow of its being easily washed into it, also to remove any little clot of blood or fold of conjunction that may separate the edges, and in this way interfere with primary union. I am inclined to think that many of the cases of suppuration of the wound are due to this cause.

The after-treatment I employ is usually of a very simple character. For a few hours, and as long as it feels agree-

able to the patient, I apply cotton-wool soaked in cold water to the surface of the eyelid, and renewed as often as it becomes warm and dry. I also drop in a strong solution of atropine three times a day, so as to keep the pupil well dilated. If pain comes on severely, and if the lid begins to swell and redden, I apply leeches (six or eight) to the temple. It is just in the early stage of inflammation that leeches are usually of service. I also at this stage, if there be pain, examine the condition of the eye. If I find that fragments have come forward into the pupil and anterior chamber, or are pressing upon the iris, I sometimes endeavour to remove them, but unless this is done within 48 hours it is not attended with a satisfactory result. If purulent infiltration have commenced in the edges of the wound, extending between the layers of the cornea, and even into the anterior chamber, which is usually indicated by the state of the lids, and may be verified by an examination of the eye itself, I generally find warm applications more suitable than cold. It is in such cases that carefully applied support to the eyelids, by means of cotton-wool (a method strongly recommended by Professor von Graefe), is especially indicated. A liberal diet is also required in such cases. It sometimes happens that the suppurative process can be arrested at this stage, and that some useful sight may be ultimately obtained, but much more frequently the purulent infiltration extends, and the eye is lost. With the exception of acute suppurative inflammation of the entire globe, it is the most serious and fatal sequel of this operation, and fortunately it is very exceptional and rare. It is, of course, difficult to trace accurately, or with any degree of certainty, the cause or causes of this form of traumatic inflammation. They are probably both local and constitutional, sometimes the former, sometimes the latter preponderating. If the edges of the wound are bruised, contused, or stretched during the drawing out of the cataract, or if any foreign body, such as blood or lenticular matter, remain in the corneal aperture, purulent infiltration is favoured. On the other hand, it sometimes occurs where

we have good reason to believe that none of these causes have been in operation, and we are constrained to fall back upon some constitutional proneness to this form of inflammation. In some cases, doubtless, both local and constitutional conditions have combined to bring about this untoward result. We must at the same time bear in mind that it not unfrequently happens where both eyes have been operated on at the same time, one has progressed most favourably, and the other has suffered from this form of purulent inflammation. In such a case we seem to be logically compelled to seek for the cause in some local conditions. A much more frequent result of this operation is the occurrence of iritis. This generally begins to show itself about the third day. It may be attended with severe pain, or it may be very insidious and painless. The pain is usually of a neuralgic character, radiating to the contiguous branches of the fifth pair. It may be attended with increased aqueous secretion, closure of the pupil, and abnormal hardness of the globe. Where this is the case, puncturing the anterior chamber often gives considerable relief, and this little operation may sometimes be repeated with advantage at intervals. Or again, the iris may be swollen and vascular, and the anterior chamber small. A third condition that not infrequently occurs is a peculiar bulging forward of the iris, with adhesion of its pupillary margin to the capsule, together with considerable recession of the adherent portion. This condition is also capable of relief by puncturing the cornea and iris, and restoring the communication between the anterior and posterior chambers of the eye. If this do not prove permanent, an iridectomy must be had recourse to. It sometimes happens that traumatic iritis is attended with severe pain of a neuralgic character, extending to the brow and the face, and taking the course of the branches of the fifth pair of nerves, sometimes occurring at irregular intervals, but not unfrequently assuming the periodic type. When this occurs it is a very painful and intractable complication. Locally soothing and warm applications, such as opiate fomenta-

tions, solutions of atropine, or belladonna, usually give the most relief. Blisters are sometimes useful, but leeches seldom benefit.

Constitutionally the indication would seem to be to sustain the powers of the system, and at the same time to quiet the nerves. A generous diet and a certain amount of stimulus must be given; tonics, and particularly quinine, would seem to be indicated on account of the periodicity of the attacks. In many of these cases, however, I have been rather disappointed, and have failed to obtain any specific or immediate effect, even from the exhibition of large doses of quinine, the attacks being complicated, and kept up by the presence of local inflammation, the specific influence of quinine is not felt. I place my chief dependence in these cases upon the use of opiates, and by far the best method is the endermic. I usually am in the habit of injecting, under the skin of the brow or temple, a solution containing from a sixth to a third of a grain of the acetate of morphia. The effect of this is usually very speedy and very satisfactory. The pain subsides, a calm condition is induced, and a quiet sleep in most cases follows.

The influence usually lasts from eight to ten hours, and when it passes off the symptoms return, but the intensity is lessened. It may be repeated with advantage every twenty-four hours, until by degrees the pain and inflammation pass off. When traumatic iritis is very persistent and severe, it inflicts more or less permanent damage upon the eye. In some cases it extends to the ciliary region and the choroid, produces effusion between the choroid and retina, softening of the globe, and loss of sight. In less severe cases the pupil is closed, the iris thickened and altered in its structure, and its colour, and the anterior chamber diminished in size. Even in the slighter cases there is always partial closure of the pupil, and formation of a false membrane, filling up the pupillary space and obscuring to a considerable degree the sight. In the course of this paper I have endeavoured to shew the advantages of the scoop extraction over the former

plan, by means of a corneal flap. On the other hand, I feel that I ought in all fairness and candour to state as the result of my experience that iritis is more frequent after scoop extraction than when the old method is used; also that the occurrence of false membrane with adhesions is by no means uncommon, which vary exceedingly in the degree both of density and opacity, and also in other qualities. These secondary membrances often cause considerable disappointment to the patient and embarrassment to the surgeon, and many cases have come under my observation in which, either through neglect or mismanagement, permanent injury to the sight has been the result. As may be readily conceived, we have every shade of variety in these membranes, occupying the pupillary space. It not unfrequently happens even in cases that have in all respects made rapid and satisfactory progress, and in which the pupil looks black and clear, that when the sight is tested with suitable convex glasses, it does not reach the normal standard. Under these circumstances we may suspect the presence of a delicate false membrane. It is often quite impossible to detect this with the naked eye, or with ordinary light. Sometimes it can be seen with the ophthalmoscope, using only a moderate degree of light and a weak lens; but the best, indeed the only sure way of detecting these thin semi-transparent membranes is by oblique illumination. By means of a three-inch lens the light of a lamp placed about three feet from the eye may be brought into a focus upon the pupil, and if this illuminated spot is examined through another lens the membrane can be distinctly seen like a fine piece of cobweb, with fine spots upon it. The tendency of this membrane is to become tougher and thicker. It can only be got rid of by means of a needle operation. It is important to determine at what period after the first the second should be undertaken. If, on the one hand, it is performed before all signs of irritation have passed off, it is very apt to light up fresh inflammation; if, on the other, it is delayed too long it is apt to become floating and elastic, and very

difficult to disperse or tear through. I think it is better to wait until the eye becomes perfectly quiet, usually from about four to six weeks after the first operation. The pupil must be widely dilated with atropine, the lids being fixed open by means of the wire speculum. A fine needle may be passed through the cornea into the centre of the opaque membrane, and depressed so as to tear it through. If it gives way readily and freely, as is usual, then all that is needful is accomplished; if, on the other hand, it is elastic and moves with the needle, then a second needle must be introduced from the other side, as recommended long ago by Mr. Bowman, and by means of the two acting in two opposite directions, the membrane, however tough, can generally be torn.

ON EXTRACTION OF CATARACT BY A TRACTION-INSTRUMENT, WITH IRIDECTOMY; WITH REMARKS ON CAPSULAR OBSTRUCTIONS AND THEIR TREATMENT.

By William Bowman, F.R.S.

Preliminary Considerations.

Of late years a general preference has been accorded to the operation of *extraction* over that of *depression* in cases of hard cataract, and also over those other methods of *discission* and *solution* in cataracts, which by the more or less soft nature chiefly of their surface, but occasionally of their nucleus also, may be supposed capable of dispersion by those means.

By *extraction* has been meant the making a curved marginal section, following nearly half the circumference of the cornea, large enough to allow the lens to slip through the pupil on the capsule being opened, and on slight compression of the globe.

When this operation has been executed according to its ideal, and when all the dangers attending the healing process have been happily surmounted, nothing can rival its excellence. Its performance almost painless, even elegant to witness; a recovery rapid and free from suffering; the preservation of a clear, moveable, central pupil; and the perfect restoration of the lost faculty of sight, may well justify the commendation so often bestowed on this masterpiece of the surgeon's skill. And no trace remains of the considerable wound through which a bulky lens has been withdrawn: *ars est celare artem*;—we seem unable to wish for a further step towards perfection.

There is, however, another side to the picture. It is but too true that these highest results cannot be reckoned on with anything like certainty in any case, and they are only actually attained by good fortune, added to skill, where most

of the attendant circumstances happen to be of the most favourable order. In a great number of other instances imperfections of one sort or another occur, either in the operation itself, or in the state of the eye afterwards, which diminish the excellence of the result; and many of these are misadventures and mischances which cannot be said to be under the control of even the greatest vigilance and care. And although the average advantages obtained far surpass those of the other methods of operating just referred to, yet distressing and tedious convalescences, and too often in the end the non-recovery of useful sight, form a sequel disheartening alike to the patient and the surgeon. This may be alleged particularly with respect to that far most numerous class, whose position in life precludes them from the full enjoyment of those aids and appliances which a protracted convalescence must require, and to whom the loss of sight is even a greater calamity than to the wealthy, since they have fewer solaces, and more dependent on them for the necessaries of life. Every experienced surgeon is aware how many eyes are eventually lost, which leave the hospital with a fair amount of sight within a month after the operation of flap-extraction. Among the rich, no doubt, a higher average of success is reached.

Moreover, since the general and happy introduction of anæsthetics, it is a serious drawback from any operation that it does not admit of their safe and satisfactory employment, and to this objection flap-extraction is exposed; for the wound is so large that the interior parts of the globe—the iris, the vitreous humour, even the retina and choroid (as I have seen)—are liable to be forced out through the flap, gaping under the distension, and perhaps the hæmorrhage, induced by those straining efforts to vomit, which now and then, in spite of all precautions, follow the exhibition of chloroform. Hence if this is to be administered, and extraction of hard cataract to be undertaken, some other method of extraction than that by the large flap must be employed.

It was this unsuitableness of flap-extraction for chloro-

form, joined with much experience of the anxiety and risks attending its after-treatment, that led me to regard with favour the proposal, emanating from Berlin about five years ago, to extract certain cataracts through a smaller opening, by excising the iris opposite the wound, and making use of a spoon for the withdrawal of the lens. Von Graefe had been the first to practise iridectomy as a step in the process of extraction of cataract in certain cases, and the spoons contrived by his assistant Schuft (now Waldau) were those employed in the first instance at Moorfields.

My first operation there with these spoons was on July 10, 1860. Earlier than this indeed, viz. in 1858, I had made use of a true spoon to embrace and draw out the lens, but this had been in exceptional cases of lenses dislocated into the anterior chamber; also twice in the case of lenses congenitally loosened from their attachments, and hanging into the vitreous humour, and where it was an obvious expedient to seize them in such a manner. I had in the first instance, in dealing with a lens in the anterior chamber, extemporaneously used a small scoop that happened to be in my surgical case, and had afterwards had a special scoop constructed. I may also observe that another true traction instrument, and an old one, is the rectangular sharp hook, long in use at Moorfields, for "fishing out" the lens when it has chanced to fall back into the vitreous humour in ordinary flap-extraction.

It is evident, however, that in all these earlier examples an *iridectomy* had formed no essential part of the proceeding. So far as I am aware, we owe to Von Graefe the first systematic combination of iridectomy, with the use of a traction instrument, in extracting cataracts of a certain solidity through an opening, small in comparison with the old flap. In flap-extraction the large wound opens so readily to give exit to the lens, that this often bursts forth at the moment when the incision is being completed; and usually, unless the pupil proves rigid, very slight external pressure on the eye suffices to expel it. But with the smaller incision no amount

of external compression can force out the lens; the iris and vitreous humour may escape, but the entire lens cannot do so. Hence it is a necessity, if the incision is to be of limited extent, to help out the lens on another principle, that, viz., of introducing a *traction-instrument* of some description within the eye, to take hold of the lens and draw it out, or at least to add this principle of traction to that of pressure applied to the exterior of the globe.

It would appear, that unless the incision is to be made into the posterior chamber, which on many accounts is inadmissible, such an instrument, however contrived, cannot be used with advantage without a previous removal of so much of the iris as lies across the track of the instrument. For otherwise either only the central pupillary area is available for the traction-instrument to work in, and this cannot, with safety to the iris, get thence into its requisite position behind the nucleus, so as to take hold of it, or else the instrument must pierce the marginal part of the iris, corresponding to the external incision, entering the lens out of sight of the operator, and almost unavoidably bruising the overlying iris, or dragging it out with the lens, so as to oblige its excision, if iritis is to be averted.

It might seem at first sight a bold thing to make the removal of a portion of the iris a condition of cataract extraction, thereby permanently altering and enlarging the pupil, when the old flap-extraction admits of so easy a removal of the lens through the natural pupil, leaving the iris and pupil in their integrity; and it is not surprising that this should have seemed to some minds a fatal objection from the outset to the new method.

But it had already become abundantly obvious to those who had practised iridectomy on a large scale, especially for glaucoma, that this enlargement of the pupil, especially if made upwards, need detract in no important degree from subsequent acuteness of vision; and, as a matter of fact, it is certain that such altered pupils admit of the smallest test-types being read.

Moreover, not only does this mode of operating admit of the administration of chloroform, but it is much more efficiently executed under chloroform, and if any sickness follow, few evils are entailed. In addition, the inestimable advantage is gained of absolute immunity from all the complicated annoyances and dangers of prolapse of the iris; so that the after-treatment becomes comparatively simple, and the recovery generally rapid and satisfactory. I speak of cases in which all the parts of the operation are well and satisfactorily performed. The operation is more complex than flap-extraction, it involves more manipulations with instruments within the eye, and demands a more perfect mastery of the exact anatomy of the structures dealt with, and perhaps more delicacy of hand to make no slip, especially with cataracts of a certain consistence. But the use of chloroform makes this perfect manipulation more easy, and no one should undertake any of these critical operations without a perfect familiarity with the shape, relative size, position, and consistence of the textures concerned. In offering a judgment on the respective advantages of various methods, it is fair to speak of each as if it were ably executed by a competent operator, according to its ideal. I have repeatedly remarked to my class during the last three years that this traction-method is in itself somewhat more difficult of perfect execution than flap-extraction, and that it has its own risks and liabilities, especially those attending the use of the tractor, but that when its steps have been all well accomplished, which they ought to be under chloroform, the patient has a much better prospect of passing safely and speedily through the healing process, and of recovering his sight, than if he had left the operating-table with a perfect iris, but with a large flap-wound and its attendant risks.

But it must not be supposed that I am for altogether abandoning the old operation. There will be occasions when a number of circumstances favourable to it combine to give it the preference over every other; those, viz., in which we can with the greatest confidence reckon on a perfect execu-

tion of the operative steps, upon complete quietude of the eye afterwards, and an uninterrupted healing process.

If chloroform is declined, and these favourable circumstances concur, flap-extraction is indicated as the less painful, the shorter, and the simpler operation. In some instances chloroform may be regarded as in itself objectionable, as in persons having a great tendency to faintness, or to stomach derangement, in whom much distress, protracted vomiting, or weakness might be apprehended. Such cases I consider to be very rare. Such results have, however, two or three times unexpectedly occurred, and caused me to regret that chloroform had been given. Often when chloroform is at first refused the scruples of patients may be overcome, and when the balance of advantage seems to be on the side of the method by traction, I urge its administration, because the steps of that operation can be so much more perfectly performed under its influence. If it is still declined, however, the traction method is by no means therefore inadmissible, only then the eye has to be more carefully fixed, the patient should be under better self-control, and the operator more entirely master of his own movements. Nothing but large personal experience can determine the best course on doubtful occasions. If chloroform on the contrary is desired, flap-extraction becomes inadmissible, as involving serious and unnecessary risks from sickness.

The circumstances referred to as favourable to flap-extraction are such as the following :—

1. As to the operation itself. A good anterior chamber, a dilatable pupil, a cataract which, by its visible characters and by its history, promises an escape of the whole lens *en masse* from its capsule (this, however, cannot always be predicted), the eye neither too prominent nor deep set, the lids not irritable, the patient calm, and able to control his movements, the eye healthy in other respects, not inclining to hardness, or its vessels disposed to grow turgid, so as to project the iris or cause escape of the vitreous when the section is made or the lens expelled.

2. As to the after-process. The having the means of keeping the patient perfectly quiet after operation, with an experienced nurse, and the requisite appliances of all kinds, mechanical and moral. Tractability of the patient, a quiet nervous system, absence of inflammatory or other tendency likely to interfere with the healing process:—this last head might be pursued into much detail.

On the other hand, where some of these favourable circumstances are wanting, as must very often happen, or what comes very nearly to the same thing, where the operator can have no confidence in the existence of those which are doubtful, prudence may well incline him to the traction method, since it must be his plain duty to endeavour to secure by the most effectual means the main object in view, viz., the recovery of the power of seeing usefully, including that of reading all ordinary type, even though the sacrifice be involved of what under the highest good fortune might have proved one further step in beauty and faultlessness of result—a central and moveable pupil.

The surgeon, then, will be strongly impelled to the traction operation in cases where a rapid recovery, or escape from tedious treatment, especially of that for prolapse, is more than usually desirable, *e.g.*, generally among the poor, in old, very weak, or nervous persons, in those of an irritable habit, in inflammatory subjects. Also in cases where the after-care of an experienced nurse cannot be procured. Also in unmanageable patients, as lunatics, or the perverse, obstinate, or self-willed. I performed this operation under chloroform, on both eyes of an eccentric, half-witted old man, who was found the same evening, to the terror of the nurse, sitting with his feet on the fender, staring with both his eyes open into the fire. I never saw a more perfect or a more rapid recovery. Also when the patient must be left after the operation in the hands of persons not accustomed to treat such, and who would willingly have as little responsibility thrown upon them as possible. Also in cases presenting complications—a large and very important class, including diabetes, and

many other morbid conditions of distant organs or the system. Also, among ocular complications, in myopia, if considerable, with its changes of the fundus, and in old choroidal and retinal lesions. I place apart, as not coming within the scope of this paper, but demanding separate treatment, numerous cases of iritic and irido-choroidal disease passing into the glaucomatous forms, which have so often to be dealt with in connexion with cataract. In all these, however, iridectomy, either previously or at the moment, forms an essential part of the treatment required for the cataract, and the opaque lens should be removed by traction.

Conversely to what was just now said as to conditions of the eye itself favourable to flap-extraction, the following make the traction principle the more suitable: A deeply set, or a very prominent eye, a very irritable eye, a very shallow chamber, a small rigid pupil, and of course an adherent one.

As to states of the lens itself, especially as regards stage of the cataract and consistence, whatever makes the loosening of the lens from its capsule difficult is so far against both modes of operating, but does not exclude either.

Details of the Traction Method.

In now proceeding to speak of the operation itself, I propose, even at the risk of seeming tedious, to enter into the minuter details, as these seem to me to be all of them important in their degree, and likely to have much influence on the opinion that may be formed of the operation by those who may be performing it for the first time, or with hitherto inadequate experience.

The operation has been rejected by some, apparently because it has been performed without due regard to the niceties which belong to it, and which, speaking generally, are necessary to its success over other methods. To communicate the details of the experience I have acquired, therefore, seems to me to be due to the operation itself, and

to those who may be disposed to make trial of it. In recommending the traction method, it is as practised with the precautions described.

Let the object be kept in view of getting away the whole lens through a small opening, with the necessary sacrifice of only that portion of the iris which lies in the track of the instrument. This has to be accomplished effectually without damage to the vitreous humour (the suspensory ligament and the posterior capsule, therefore, have to be left entire), and without any mechanical injury whatever to that part of the iris which remains, and which, therefore, is little liable to traumatic inflammation. The eye has to be left by the operator without its lens, and with an altered pupil, but otherwise uninjured, except by the usually harmless marginal corneal incision. All the details of the operation go to secure this result.

Chloroform should generally be given, and if given should usually be given fully, so that the eye remains quiescent throughout the operation. When it seems desirable to administer as small a dose as possible, I often make the preliminary incision and the iridectomy under its partial influence, reserving its full effect for the most critical period—the introduction of the instruments which have to deal with the lens,—a period lasting perhaps only a few seconds.

Operation.—If the pupil is small and rigid, atropine may as well be applied previously, otherwise not. The patient lies on his back with the face upwards, and his feet towards a window. The operator stands or sits beyond his head, which is slightly inclined towards the light, uses the wire stop-speculum for the lids, and fixes the eye with forceps, which take hold of the tendon of the lower rectus precisely in the middle, close to its insertion. He then rolls the eye downwards, with care not at first either to compress or to pull upon (I do not mean to rotate) the globe, for to pull upon it is really to compress it. The holding forceps should be slightly toothed, so as to seize the tendon readily. To seize the tendon, or at least the subconjunctival tissue, and

not the conjunctiva only, is to obtain a perfect hold on the globe; the conjunctiva alone may tear away, or by sliding on the globe may render the forceps no longer the guide they should be to the point of incision, by being precisely opposite to it; for the eye, in being held downwards, is usually somewhat rotated on its antero-posterior axis. During the act of iridectomy, unless the eye is quiet and lies well, I generally give the fixing forceps to an assistant, taking them again into my own left hand while the traction-instrument is being used with the right hand.

As to the incision. *Position.*—The iridectomy should be usually made directly upwards, both because it will not be visible afterwards, and because, being covered by the lid, it will the less detract from the optical perfection of the organ. The lower or central part of the resulting pupil will be that used in vision. It is perhaps a little less easy to execute the steps of the operation when the upward direction is chosen, but if the eye is rendered passive by chloroform, and the globe rotated sufficiently downwards without being compressed, no real difficulty need occur.

Shape.—The lancet-shaped knife (which should be slightly bent on the flat, and of which the cutting edges should meet at an angle of about 50° or 55°) should enter the extreme margin of the anterior chamber, and be pushed on with its flat parallel to the iris, until its point reaches the opposite rim. It is then gradually withdrawn, and as the aqueous flows slowly away it may be made to enlarge the wound at one or both angles, if requisite. In withdrawing it the point may incline to one or other side of the chamber, so that the lens should not incur risk from the point traversing the pupillary space, in case of any sudden, unexpected movement of the eye. This is a good precaution in all cases of iridectomy, but, of course, all the more important when the lens is transparent, and not to be involved in the operation.

The wound thus made is curvi-linear, and follows the rim of the chamber, passing through the corneo-sclerotic junction. It cuts this tissue not vertically, but in a plane

about parallel to the iris, and its middle part and ends are in the same plane. As it need hardly in any case occupy more than a fourth of the circumference of the cornea, the effect is that if the globe is compressed by the lids, or if the vessels of the eye become turgid under the chloroform or afterwards, so as to occasion internal distension, the wound hardly gapes, it rather closes; whereas if the eye is slackened, the hinder or sclerotic lip is easily pushed back, and the anterior or corneal lip forwards, by the traction-instrument inserted, so as to allow blood to escape from the chamber, and to give ample room for even a bulky lens to emerge under the guidance of the tractor. The incision thus made is near to the equator of the lens, which is thus more easily dealt with by the tractor, and fragments of it do not easily elude the instrument by slipping up behind the posterior lip of the incision.

The incision is faulty in direction if its ends leave the line of the corneo-sclerotic junction and curve into the cornea. It then describes an arc of a smaller circle. The flap formed is less roomy for the exit of the lens, and yet it is more disposed to gape and lie unevenly; moreover, the iris is less perfectly excised at the angles. It is more exposed to be bruised there, and lateral fragments of the lens to be entangled and left in, occasioning irritation afterwards. This faulty form of flap is familiar to operators by the old method, when the incision has not been a happy one. The *direction* of penetration should be the same at all parts of the incision, viz., from first to last in a plane nearly parallel to the iris, and just in front of it.

Extent.—A judicious operator will vary the extent of his incision by his estimate of the probable size of the firm cataractous substance which has to pass through it, always taking care that the opening is *large enough*. It is far better to have it too large than too small, and it is particularly desirable that it should be ample in such old cataracts as are supposed to have their margin easily detachable in small segments. For one of the disadvantages of this traction

method is the liability to have the sides of the lens separated and left behind near the angles of the wound, giving rise to subsequent irritation; a too narrow path of exit disposes to this, and in such cases an incision of nearly one-third of the corneal circumference, especially when the cornea is small, is desirable. In old cataracts that have had formerly a softened surface, the remains of this seem often to accumulate at the equator, where they undergo fatty degeneration, and readily break off in chippy fragments.

Where the whole lens is firm and of nearly equal consistence up to the margin, as in some old cataracts, and also in those of slow progress in middle-aged persons, which have commenced with striæ near the surface, the opening should be proportioned to the size of the cataract, so as to give it room enough to emerge; but the largest-sized opening is nevertheless not required, as the margin of the lens does not break off, and the whole admits of being drawn out entire and with safety through an opening comparatively small.

The cases for which the smallest incision will suffice are those where we may be pretty sure that the nucleus, if hard, is small, and the surface of the cataract diffluent, or pulpy or semi-fluid. The opening is then made to suit the size of the nucleus, it being certain that the surface matter, though abundant, will be effectually got out easily through the same channel. But it is important here to have regard to the exact consistence of this surface matter. For though very soft it may not be so loose and diffluent as to flow easily from behind the iris into the pupillary space, and so out at the wound, but on the contrary, it may be glutinous, adhesive, and semi-transparent, and therefore much more apt to remain within the chamber if the harder nucleus has to emerge through a narrow wound, through which it can only come stripped of its surface matter; whereas if the opening be ample, the surface matter or the greater part of it may be made to emerge with the nucleus, without being much detached from it, if care be taken in using the scoop.

When it is wished to make an opening of the largest size,

this may be best effected by enlarging the wound at one or both angles on withdrawing the knife, and to do so has the additional advantage of making the inner aspect of the section as wide as, or wider than the outer, which a lance-shaped instrument, if allowed to cut only in entering, could not accomplish; and this shape of the wound, irrespective of its mere size, is probably favourable to the escape of lens-fragments. Even if the knife has to be re-introduced, I prefer it to the scissors, which are apt to cut too much within the corneal margin, and not in the same plane as the knife has done; moreover, they cannot be made to cut conveniently at either angle indifferently as the knife can do, without the operator changing his own position; and I also think them more likely to bruise the iris.

As to the Iridectomy —In dealing with the iris in this operation, the great object is to secure the eye against inflammation of that part of the iris which remains. If the nucleus of the lens is small and the surface of the cataract diffluent, so that the extraction by a small opening is easy, and the risk but slight of small glutinous or hard fragments remaining behind, the iridectomy need not be large. In some such cases I have so managed as that the pupil has remained afterwards nearly circular, the pupillary margin having been rather divided than excised, the iridectomy involving chiefly the upper part of the membrane. No doubt the less excised the better in an optical sense. But a far more essential thing is to secure the eye against inflammation of that part of the iris which remains; no portion of this should be on any account contused or rubbed against either the lens, the cornea, or the instrument. It is much better therefore to excise widely than by removing a smaller piece to hazard the bruising the edges of the remainder during the movements of extraction. It is better to err, if at all, on the side of an ample excision. The margins of the cut part are then also not so liable to entangle fragments so easily, or to become irritated by their presence if retained.

The iris is seized by the small curved forceps, drawn out,

and snipped off by scissors. I used to leave its ciliary border, but I now much prefer to excise its whole breadth, as being the safer method. What remains is less on the stretch, yields more, and is less apt to become inflamed; moreover, with care there is then no greater risk of the escape of vitreous. The mode of seizing with the forceps influences the amount excised. If a small excision is desired the blades should open very slightly and seize that part that lies opposite the centre of the corneo-sclerotic incision, and which is midway between the ciliary and pupillary margins, and it should not be drawn out much before the scissors are applied. If a large excision is intended, the blades of the forceps should open more widely, and the iris may be dragged out further, and be thus torn from the ciliary attachment to the required extent before being cut off.

It may be cut off by a single movement, or divided first in the middle and then at each angle of the wound separately. A method, which I think a good one, and generally follow now, is to seize it and tear it a little from its ciliary attachment near the right-hand angle of the incision, and cut it across there on the right of the point held by the forceps; then tear it away as far as the opposite angle of the wound, and cut it across there also. By pulling it out at the angle of the wound before cutting it off, the ciliary separation and the iridectomy may in this way be easily made more wide than the incision itself, which in some cases is advantageous, and is always safe, since the cut margins of the iris recede well away from the track of the instruments dealing with the lens, and cannot lie in the angles of the wound afterwards. I think it likely that when iritis follows this operation it is often an extension of irritation either from the ciliary edge of the iris left remaining at the site of the iridectomy, or from its cut margins bruised by the tractor, or entangled in the angles of the wound.

If blood flows into the chamber so as to disguise the iris and lens, either before or after the iridectomy, I prefer waiting till it ceases to flow, and to remove it, before proceed-

ing with the next step. It should be removed as it flows, and before it coagulates, by inserting the point of the curette, if necessary, between the lips of the incision, while the forceps holding the lower rectus tendon, slightly pull or compress the eyeball.

It is not often indeed that blood does flow to an extent to require this, but if it do, and is left in, it obscures the view, and thus not only renders the succeeding steps less delicately exact, but makes it less easy to spare the remaining iris from all injury, and to withdraw loose fragments of lens. Hence I insist upon this point of practice.

Opening the Capsule.—The next step is to open the capsule. This is done with one of the ordinary flat-ended prickers used in flap-extraction. I have only to intimate the extent or the opening and the precautions to be taken. The object is so to open the capsule as to destroy or effectually tear through *all* that part which lies in front of the attachment of the suspensory ligament, but to save the suspensory ligament, and all the capsule behind it, as a safeguard to the vitreous humour. Opening the capsule thus freely facilitates the escape of the marginal lens-substance, and also lessens the chance of subsequent so-called capsular opacities in the pupil. Such opacities often depend on portions of the anterior capsule rolling up and enclosing its lining of cells or even portions of superficial lens-substance, and if the membrane has not been (so to say) comminuted, but only split open in one or two directions, these opaque portions are apt to form bands standing across the pupillary area, the too limited orifice made in the capsule at the same time contracting as the whole capsule falls somewhat together centrally towards the pupil.

If the opening has been made by comminution of the capsule, but to a too limited extent, corresponding perhaps only to the middle third of its area, or to the pupillary area at the time of operation, and has not been carried behind the iris as far as the vicinity of the suspensory ligament, the margin of the orifice is very apt thus to rise afterwards across

the pupil, and to require to be dealt with on a subsequent occasion.

The pricker should therefore be at first passed flat behind the iris to the farthest part intended to be opened, then its point should be turned into the lens there and brought up with slight movements, first on one side, then on the other, comminuting the capsule in its course within the line of attachment of the suspensory ligament, under cover of the iris. It may then be made to tear the central part, and finally that part nearest the external incision, where the traction-instrument is about to be inserted.

Here it may be moved a little more freely, so as to break open a way for this instrument at the upper edge of the nucleus, especially if the nucleus is large, or its surface adherent to the capsule. It is essential that the pricker should be used with a light touch, that the iris should not be bruised, and that the body of the lens should not be pushed backwards or sideways by it, lest the vitreous should be burst into. The operator should bear in mind the delicacy of the sustaining tissue, and that his object is to lay open the capsule properly, without any displacement of the lens. To ensure this in the greatest degree, I always take care that the chloroform at this critical moment has made the eye quite motionless, and I hold the eye myself with the forceps both at this period of the operation and during the use of the tractor.

I attach considerable importance to another point of practice, viz., the loosening of the body of the lens from its capsule before introducing the tractor, whenever, either from the immaturity of the cataract, or the large size of the nucleus, and absence of superficial soft matter, unusual difficulty in the introduction of that instrument might be expected. In tearing open the capsule the condition of the lens in this respect is probably ascertained. This loosening I effect either by the common pricker or by the fine needle already referred to (having the point bent at a right angle), which has long been in use at Moorfields, for pulling out the lens in ordinary flap-extraction, when it refuses to

escape in the ordinary way, or has dropped back into the vitreous humour. The point of this is thrust back into the lens-substance near the margin (and particularly without pressing the lens backwards towards the vitreous, which might force this humour out through a rupture of the suspensory ligament) so as to get a hold of it without displacing it, and then the body of the lens is slightly rotated on its antero-posterior axis to and fro within the capsule until it is felt to be loose. In immature cataracts the loosening is often attended with a sudden falling forwards, which at once explains itself to the operator.

I have come to adopt this method in certain cases, from having witnessed the failures not infrequently attributable to the difficulty in passing the tractor behind the nucleus, when the body and capsule adhered. Every operator knows how much the risk of the ordinary flap-extraction is augmented by this adhesion of the body to the capsule in immature cataracts. The lens escapes with difficulty—more pressure on the globe is required to expel it—and portions of it are very liable to be left adherent to the capsule behind the iris, where they become a fruitful source of irritation afterwards. The same risk is incurred, but to a much less extent, when iridectomy is practised. As circumstances often are urgent against delaying operation till the cataract is more complete, I think in such cases, when the traction operation is chosen, this little proceeding is a useful addition to its safeguards; and it might be applied also, where called for, in flap-extraction.

While opening the capsule the operator at once learns the consistence of the cataract with which he has to do, and knows better how to deal with it in the subsequent steps. If soft matter is abundant around the nucleus, and sufficiently diffluent, it is well to allow some of it to escape at once by the wound. Slight pressure on the globe facilitates this, and thereby more room is afforded for the traction-instrument within the eye.

The *use of the traction-instrument* has next to be consi-

dered. The *course* it has to take,—at first backwards and then downwards, so as to embrace the nucleus,—has to be estimated with exact reference to the shape, size and position of the lens, and it is by no means difficult for a young operator to commit an error in this respect. It must pass between the nucleus and capsule without pushing the nucleus from its place, and without breaking into the vitreous humour, or bruising the iris, and if the nucleus be not already loose from the capsule, one or other of these accidents may happen very easily. The more blunt or obtuse the end of the traction-instrument, the more likely is it to displace the lens in the attempt to get beyond the nucleus, and it is particularly apt to do so if it be pushed on too rapidly, or if it do not dip sufficiently behind it.

This may introduce a few remarks on the *principles to be observed in the construction of such an instrument*. It is obvious that as a comparatively small opening is made for the extraction of the lens by this method, and as the instrument which has to withdraw it has to be introduced by this opening and to be manipulated within a very confined space, the smaller its own bulk, consistently with its due efficiency, the better. I have from the first found the larger spoons of Waldau too large and cumbrous, and in the course of my first year's operations asked Mr. Weiss to make me a smaller ladle, adapted in size and shape to the posterior surface of the nucleus, but oval, using either this or Waldau's smaller spoons with a satisfactory result. In certain cases, however, as when the adhesion to the capsule was firm, or the cataract hard and large, more difficulty than usual was experienced in the introduction of the spoon, which either pushed the lens before it, or broke away through the posterior capsule into the vitreous, thus marring the operation. The ingenious spoon contrived by my friend Mr. Critchett, and described by him in the "Lancet," June 11, 1864, (& Ann. d'Ocul. t. 52. p. 115.) slips more easily than Waldau's between the nucleus and capsule, and also obtains a hold on the nucleus on being withdrawn; and I should have been content with

it but that another shape seemed still better adapted to the course it had to take, as well as to lay hold of the lens on the further side of the nucleus. In Mr. Critchett's slipper-shaped spoon, the end being wedge-like, the extreme edge by which it enters must go beyond the nucleus to a distance corresponding to the length of the wedge before the recurved edge can take hold of the nucleus in withdrawing it. In proportion as the wedge is more acute and long it will enter better, but the point must go further ere the nucleus can be seized; in proportion as the wedge is more obtuse it will enter less easily, but the point need not advance so far, and it takes a better hold; but whether acute and long or obtuse and short, it seems to me still to occupy space disadvantageously behind the nucleus. Hence I prefer another principle than the wedge—to have the end not recurved towards the handle, but looking from it at a very obtuse angle with the body of the spoon, the extreme edge by which the instrument advances being very thin, so curved from side to side as to enter more readily, yet so square as to take a rather broad hold of the nucleus (See Fig. 1, enlarged 2 diameters). The body of the spoon is very nearly flat from side to side, a little concave forwards from end to end, and the incurvation of the extreme end is in fact a continuation of this concavity, though inclined to it at an obtuse angle. Where the end joins the sides of the spoon this incurvation gradually ceases, and the sides, except towards the end, have no edge above the general level. The whole is as thin as possible consistent with due rigidity, and the breadth about half or a third that of the lens. The stem is slightly curved, to adapt it to the position of the brow, across which it has to work in the ordinary iridectomy upwards.

Fig. 1.

I have found a spoon thus constructed to be very suitable in the great majority of cases, to be easy of introduction and manipulation, and also to take excellent hold of the nucleus when the handle is properly depressed at the right moment. It is also useful in withdrawing loose fragments after the main bulk has been got out.

Another modification of shape, however, seems even preferable where from the entire absence of soft surface matter there is the least room for the insinuation of an instrument between the lens and its capsule, and where therefore it should occupy the least possible space. This form is nearly flat from side to side, and but slightly concave from end to end (See Fig. 2, enlarged 2 diameters). The end has a very thin though not a sharp edge, only slightly incurved, and the concave surface at the end is roughened by tranverse lines. It is thus fitted to insert itself readily between the nucleus and posterior capsule, particularly if poised, as it were, only by the thumb and a single finger, and made to advance with a gentle laterally wriggling motion. Then, when the handle is lowered, its end rises in the lens-substance beyond the nucleus, and obtains an excellent hold on it for its extraction. It appears to me that the double advantage of facile and safe introduction with extractile power is secured in the most effectual manner by these instruments. Both may be conveniently placed on one handle, as in Fig. 3, where they are represented of the actual size.

Fig. 2.

In a few instances, especially where the nucleus has been small and loose, and inclined to extrude itself through the incision at the instant of opening the capsule, I have not introduced any instrument at all into the chamber, but have helped out the nucleus by the pricker, rotating it a little while slight pressure was made on the globe. In other in-

Fig. 3.

stances I have endeavoured to pull out the nucleus by means either of the ordinary pricker, or of a two-pointed fine hook introduced through the incision; but this latter method I soon abandoned. The advantage I saw in it was the small size of the instrument used, but I found that if it was passed behind the nucleus it too readily entered the vitreous humour, and if in front of the nucleus the retractile movement was accompanied by too much pressure backwards to be effective; and moreover the vitreous was thus also endangered. It is possible, however, that an instrument shaped on this principle might be made to act with advantage, at least where the surface of the lens is soft. But in proportion as the nucleus is small and loose, the precise construction of the traction-instrument becomes of less importance. If a hook is employed, it can act only on the harder part of the lens, whereas the spoon-shaped tractor is available for the softer portions also, and so is more useful on the whole.

If the nucleus is to be drawn out with safety through an opening only just large enough for it, it must be supported behind by a somewhat flat or concave instrument, which must be so shaped at its end as to grasp, as it were, the further side of the nucleus. This grasping power, obtained by an incurvation of the further end, should be so effectual as not to render necessary too much pressure of the whole lens forwards against the iris and cornea, whereby the iris might be bruised. The lens should be well held by the instrument, so as to be withdrawn without pressure either forwards or to either side. The act should be one of *traction*, and this should usually be unaided by any *expulsion*, any pressure or pull on the globe. If any such is employed it should be remitted as the nucleus is emerging, so as not to risk the loss of vitreous humour. It is very rare, however, for any such loss to occur.

Doubtless a chief disadvantage of this method consists in the liability to detach marginal portions of the cataract, and to leave them in the eye, where they may irritate the iris or angles of the wound. It is most desirable to secure, as far as possible, the withdrawal of the lens *en masse* by having the incision sufficiently large, and by the utmost delicacy in manipulation. But it must very often happen that fragments, either hard or soft, remain behind after the withdrawal of the nucleus. These, if soft, may generally be made to emerge easily by gentle pressure on the globe by the forceps, or through the lower lid, while the curette holds open the lips off the wound. But if harder or more glutinous they are to be got away by careful re-introduction of the tractor, or of a smaller spoon, or the ordinary curette. If the anterior capsule have not been widely broken open at first, the fragments may lie beneath portions of it, and so elude the instrument. It is then better to leave them there than to make too many attempts to remove them, for in these attempts the iris is very apt to be contused, or the vitreous to be broken into.

If the posterior capsule have been unfortunately ruptured, the vitreous humour may envelope fragments and press them against the iris. Some of these may perhaps be got away easily, but failing this they should be left in. In such a case we need not be too anxious to limit as much as possible the loss of vitreous. The eye often seems even to do better with a loss of two or three minims than of one; and if any at all be lost, there is often an advantage in encouraging the loss to this extent.

At all events we need then have no hesitation in dipping in the curette to fetch out fragments of lens, even though at such a loss, if we are only careful not to bruise the iris. Portions of vitreous humour lying near the iris during the few days subsequent to the operation no doubt constitute a certain risk, because they may entangle portions of lens and mechanically irritate it, and because, if any inflammation arise, they form a stratum to which lymph easily clings, and

thus serve to shut off the aqueous from the fragments, and delay or prevent their absorption. I have now and then extracted such enclosed fragments unaltered months afterwards, when dealing with an occluded pupil. If a considerable quantity of the front and central portion of the vitreous have escaped, what remains in the anterior chamber and pupil on the completion of the operation soon falls back from the pupillary region as the aqueous is re-secreted, and the iris and lens-fragments are thus left more free in aqueous humour, and the above risks are much diminished.

It is nevertheless, of course, better to extract all fragments if it can be done with safety, and I may here mention my *suction-syringe*, with a larger orifice than usual, as of great use in this respect. Fragments which refuse to be brought out by the curette or spoon will often be completely manageable with the syringe. The sucking orifice admits of being turned in any direction, so as to seize such fragments without interfering with the iris at all.

What has now been said will perhaps be sufficient to explain all the more important details regarding the use of the tractor. I have only to add that if it should happen that the suspensory ligament gives way so as to occasion loss of vitreous humour either before or after the iridectomy, but before the opening of the anterior capsule, the better plan is, after completion of the iridectomy, to dip one of Waldau's larger spoons well behind the lens, and extract it in its capsule. Sometimes the lens is loosely hung, and the vitreous prone to burst forwards, whatever operation for extraction be performed. In such cases the traction operation has manifest advantages over the old flap method, not only by the small size of the section and the impossibility of subsequent *prolapsus iridis*, but by the far greater facility it affords of pulling out the lens.

When the lens is done with, any fragments or strings of coagulum remaining about the angles of the section are to be cleared carefully away, the wire speculum removed, and the lid closed. It seems to matter little what applica-

tions are subsequently employed. A piece of fine linen, covered with cotton-wool or charpie, and retained by a suitable bandage, affords a support which is well adapted to the first few hours after the operation, especially if vomiting occur. If the bandage proves hot, or if the lids are irritated by its movements, acting through the linen adhering to them, a simple wet rag often renewed may be substituted for it. The comfort of the patient is generally the best guide. Atropine lotion or drop is indicated if any fragments of the lens have remained in the eye, and a few timely leeches near the outer canthus if pain occur, especially increasing or throbbing pain; but these are very seldom needed.

After-course and treatment.—The management of the eye after traction operations does not seem to demand any special remarks. It will, I think, be generally found more simple, and attended with less anxiety to all concerned, than that following ordinary extraction. This results chiefly from the smaller size of the wound, and the immunity from prolapse. The room should of course be shaded, but the patient may be up or in bed, and may sleep in any posture; the hands need not be restrained during sleep; coughing or sneezing cannot disturb the wound; if inflammation occurs, the eye can be examined without risk, and the requisite applications made to it; it may safely be washed even by the patient himself. Were it necessary I could adduce many striking facts in corroboration of these remarks, several of them relating to instances in which one eye had suffered from the accidents incident to flap-extraction, but where the traction operation performed on the other eye was afterwards attended by the best results.

It is no part of the object of the present paper to describe at length all the modes in which an operation by the method of traction may fail. It must certainly be expected that in a large number of operations some will be completed with less perfect fulfilment of all the indications than others, and that even among those cases in which all

the steps are perfectly accomplished some will, from unexplained causes, suffer more than others during the healing process. The flap and the traction operation both involve the risks incident to an incision into the coats of the eye. The wound may fail to heal in a kindly manner, may go on badly in a variety of ways. The advantage of the traction wound is that it is smaller, that it can hardly undergo displacement, that it cannot be complicated by prolapse: it also admits of being more safely examined, and, if necessary, topically treated; I speak in each case of the wound made upwards. Both operations involve a danger of iritis, but the large size of the iridectomy-pupil gives more room for any loose lens-fragments, which, therefore, are less apt to be injurious as mechanical irritants to the iris than after flap-extraction, when the pupil closes upon them the more, the more the iris is inflamed. Serous iritis of low and obstinate character may also follow either operation, as may suppuration of the globe, and other occasional or exceptional results.

Results of the Traction Method.

Time has so confirmed my early good opinion of the traction operation as to lead me to apply it each year since 1860 to a continually augmenting number of cases, and as experience has accumulated I find the average of success has risen. It has uniformly been higher than that of the flap-operation in my hands. I have taken some pains to ascertain the final results of my cases, and from a careful review of all those of which records have been kept, amounting to more than a hundred and thirty, I feel able to speak with some confidence on the subject.

1. The *first* class are those in which *the power of reading a small type* (viz., up to No. 6 of Jaeger) has been obtained. Several of these have been able to see No. 1, and many Nos. 3 and 4, but all have been able to read No. 6. The average number reaching this degree of success has been 68 per cent., or taking only cases treated in private, they have been 75 per cent., or three-fourths of the whole. Of

these last, 55·8 per cent. have not required any secondary operation, 19·2 have attained the result only after a needle operation on the pupil.

2. The *second* class comprises cases in which the power of seeing a type ranging between 6 and 14 of Jaeger has been gained, which might be termed very useful sight for all ordinary purposes. The number of these cases has been in all 14·5 per cent. Of this class the cases treated in private, if separately enumerated, rise only to 13·4 per cent., a greater number having probably been raised by secondary operation out of the second into the first class in private than in hospital practice.

3. The *third* class comprises such a very limited result as allowed of the patients having fair perception of light of colours, of large objects, of fingers held a foot off, and of seeing their way about in an accustomed place, only some slight improvement, in fact, of their previous condition of complete cataract. These are in all 9 per cent.; or of the hospital cases 11·4 per cent., and of private cases 5·77 per cent.

4. The *fourth* class are lost eyes, either bare perception of light, or none. These are (all included) 8·4 per cent., or of hospital cases 10·1 per cent., of private patients 5·77 per cent. Thus also classes 3 and 4 show a higher average of success in private than in hospital practice.

In judging of the real meaning of these results, it must be borne in mind that there has been *no selection of cases most favourable for the operation.* All are noted of which record has been kept, and all patients were operated on to whom it seemed right to offer the chance of an operation, though that chance might be a slender one. Indeed, it may be truly said that the list contains a more than average number of unpromising cases, since the cases selected during the same period for flap-extraction have been generally those of uncomplicated nature, the traction operation having been adopted in almost all those of the more doubtful kind, according to the indications laid down in the earlier part of

this communication. And several of the more satisfactory results have been obtained by the traction operation on the second eye, when the first, from one cause or another, had gone on badly under flap-extraction. It is my decided conviction that had the same series of cases been operated upon by the flap method, the results would have been much inferior.

On Capsular Obstructions, and their Treatment.

Allusion has been just made to secondary operations on the pupil, required in some instances of the traction operation. Capsular obstructions have been hitherto chiefly studied after flap-extraction, or after needle operations either for depression or solution, where the pupils, if not closed, have usually been of small size, and the precise nature of the obstruction, therefore, often hard to scrutinize. The larger size of the pupils left by a mode of operating of which an iridectomy forms an essential part, has made it possible to study the physical characters of such obstructions with more precision, and to lay down some rules for their treatment, which it may not be inopportune to allude to briefly on the present occasion, although the subject is in itself sufficiently important to warrant a more extended notice. I believe many persons are allowed to remain with a much more imperfect sight than is attainable, through such obstructions being overlooked, or, at least, not operated on; and also that some others, in whom a secondary operation is undertaken, fail to reap the benefit of it through some defect in the manner of its performance, or in its after-treatment.

In speaking of the mode of opening the capsule, I insisted on the desirableness of completely breaking up its anterior portion nearly up to the circle of attachment of the suspensory ligament. I do not say that on every occasion this can be perfectly accomplished. The escape of fluid or soft matter on the first rupture, or the presence of a little blood, or the narrow dimensions of the pupillary area, or something in the position or movements of the eye may now and then

render it difficult, but it is always to be attempted. If the central area opened up be too small, or if the anterior capsule be rather split open than comminuted, portions of it are very apt to remain athwart the pupil afterwards, and to become a cause of imperfection in the retinal image. They may do so—

1. By affording a surface on which effusions of lymph may rest, with or without particles of lens-substance entangled either in their folds or between the anterior and posterior portions of the capsule.

2. By becoming, even without apparent inflammation, the seat of opacities slowly formed on the inner surface of the capsule by an imperfect process of growth from the lining of intra-capsular cells, which last, as Dr. Schweigger has shown, may remain attached to the capsule even when it has been freely broken open and exposed to the action of the aqueous humour. No doubt this imperfect cell-growth does not go on interminably. It seems particularly apt to occur in portions of the capsule, which have retained in some degree their natural separation from the aqueous humour, by becoming shut up within the involutions which this membrane is prone to form when, on being ruptured, it rolls up in a direction contrary to that of its normal curvature when unbroken;* also in cases where the opposed inner surfaces of the anterior and posterior portions of the capsule have fallen together, with or without the interposition of some remaining layer of adherent lens-substance. If such surface structure is included, it may indeed become the source of new lens growth of very appreciable thickness, usually opaque, but occasionally, as I think I have seen, having in some degree, and for a time, the transparency of natural lens-substance. Both these varieties, but rather the former, may in process of time assume much toughness, especially if inflammation have added to them any fibrinous films.

3. By the capsule becoming not opaque itself, which

* Vide Lectures on the parts concerned in the Operations on the Eye. London, 1849, page 63.

perhaps it seldom or never does, nor the bed to which opacities adhere, but simply wrinkled and folded in such a way as to refract the light unequally in its passage, and consequently to confuse the image. It is to this particular cause of imperfect sight that I wish to draw attention.

Nothing perhaps has occurred in the course of the convalescence to excite any suspicion of an imperfect result. The eye has been originally a most promising one, the pupil active, the tension natural, and no pain or inflammation has succeeded the operation. The patient declares he sees objects brightly, yet on a trial with the usual series of lenses no clear image can be obtained. At an early period, perhaps, *i.e.*, within a few weeks, the acuteness is indeed considerable; but on subsequent trials, weeks or months afterwards, a deterioration seems to have occurred, which is often not unnaturally attributed to a failure of the retinal power, because no inflammation has been noticed, and on a cursory examination the pupil exhibits no opacity sufficient to account for the defect. On lateral focal illumination a very delicate film may perhaps be detected, but even this not necessarily, and it is altogether much less in amount than what the surgeon often sees to be compatible with much better vision than that which he finds to exist in the case under his inspection. The ophthalmoscope now comes to his aid, and is the best discriminator of the actual condition. He finds that no sharp image of the fundus, and particularly of the optic disc, can be obtained. The situation of the disc is detected by its whiteness, and perhaps, according to the degree of the capsular fault, its general shape, or even its vessels, may be observed, but irregularly distorted, as though seen through finely wavy glass. As his lens moves, the image of the disc is seen through successive portions of the pupil, and is seen differently according to the variation in the capsule at different points. Finally, keeping the optic disc in his line of sight, as the best foil by the whiteness of its reflex, he brings the lens sufficiently far from the patient's eye to have the capsule itself in its focus,

and he then sees the actual wrinklings of the transparent membrane by means of the various inclinations given by its folded structure to the rays of light. There are dark and bright lines or streaks varying with every movement and slope of the lens he holds, indicating the lines of direction in which the emergent light is so deflected that it fails to meet his view, or comes in augmented intensity. The phenomenon is not dissimilar in its nature from that observable in conical cornea, but in this latter there is more distortion of the optic disc as a whole. It is seen, perhaps very distinctly, but much distorted, whereas when observed through these fine multitudinous wrinklings its general shape may not be far from natural, though the parts of which it is made up are comminuted or broken, so that its details cannot be discriminated.

I have hitherto spoken of obstructions formed by the anterior capsule. It is obvious that the two first forms above enumerated (the capsular *opacities*) may either necessarily or probably involve the posterior capsule also; but the wrinkling of the *still transparent* capsule spoken of under the third head is much less apt to do so, though it occasionally may; for in the operation supposed, the rim of the capsule and the posterior layer being untouched, not only the rim does not fall much together, but any shrinking of the posterior capsule afterwards is likely to be even and uniform, and were it otherwise the greater tenuity of this portion would render it less disturbing by its false refraction than a similar folding of the anterior part. Moreover, I think it probable that as the eye settles into its ultimate balance of tension and position of textures after the operation, the vitreous humour, where bounded by the posterior capsule, falls sufficiently forwards to have rather a convex than its former concave shape, and that then the posterior capsule becomes somewhat convex forwards, and wrinklings in it are avoided. Such a convexity of the vitreous in the pupillary area, even if unsymmetrical, would hardly mar the image in any sensible degree, since the index

of refraction of the vitreous differs so little from that of the aqueous. Nevertheless, I have sometimes thought that such an abnormal form of the front of the vitreous, if presenting a very sloping surface forwards, has really been of some detriment, where the media in the pupil presented absolutely no opacity.

And now, as to the principles which should guide us in dealing with such capsular obstructions by a supplementary operation. The question is an important one. Patients not seldom dislike an additional operation, particularly as in few cases can we truthfully aver that they run no risk whatever by undergoing it. Particular reasons may vary in different cases, but in general I should advise a patient to be content without a secondary operation if he is able to read 5 or 6 of Jaeger. If the wrinkling of the capsule, however, be in such a case the sole obstruction, and he wishes to see still better, I am quite willing to tear it through, using the precautions presently to be described.

1. In general, no operation should be undertaken until the eye is entirely free from any inflammatory or congestive tendency, that may have followed upon the original operation. For even the slightest operation of the kind will sometimes re-excite the circulation of an eye that has been recently inflamed, especially tediously or sluggishly inflamed; and then new inflammatory films may result, depriving the patient of the benefit he has been led to expect, as well as disheartening him as to the effect of any future interference. But if the organ has for a month or two been entirely quiet, the sooner an obstruction admitting of removal is dealt with, the better for patient and surgeon.

2. In contemplating any operation on a capsular obstruction of the pupil, the first thing is to ascertain as far as possible its exact nature, whether it is complicated or not with any adhesions to the iris, and if so, where these lie, and what is their extent. We should examine the mobility of the pupillary margin under varying light, and its exact behaviour under atropia, following this up by lateral focal

illumination, and, above all, by such an ophthalmoscopic examination of it as has been above alluded to. The precise condition in each individual case ought to be clearly ascertained by the operator ere he proceeds to deal with it instrumentally. The ophthalmoscopic examination after atropia should immediately precede the operation, that the picture of the parts may be in his mind, and he must remember that the view of the pupil as the patient lies on the operating table is a different one from that previously obtained, and generally insufficient of itself to inform him of the real nature of the obstruction.

3. Dismissing for the present those cases of denser opacity, with cicatrized, contracted, totally adherent pupils, the result of chronic inflammation, and confining my remarks to the ordinary obstructions following the traction method, in which the pupil is not much smaller than it was made by the operation, the following rules are to be observed.

a. Chloroform may or may not be given, but if wished for, it may as well be given to a slight extent, so as to lessen the sensibility, but not to produce unconsciousness, the patient being told to restrain his movements. I have not found any inconvenience from doing this. If he should prove uncontrollable it may be given to a greater extent; but the operation is brief and never very painful, often it is hardly felt even without chloroform. If this is administered, however, the globe may be held with less compunction by the forceps, and to do so certainly adds to the precision of the steps.

b. Two needles should be at hand, so that the second may be used if required. Both should be as fine as is consistent with strength: they should be cutting for a twentieth of an inch at the spear points; the stem should be cylindrical, should enter and move backwards and forwards easily in the corneal puncture, which it should at the same time perfectly fill, so that no aqueous humour should escape until the instrument is altogether withdrawn. When the opera-

tion is over, the needle should be withdrawn gently, and the lids at once closed, so that no pressure on the globe follows. In this way it may often happen that almost no aqueous is lost even through two corneal punctures: from which the advantages result of no bursting forwards of vitreous humour through the pupil, no displacement or stretching of the pupillary margin or iris, and none of the pain and after ill-effects often due to this latter cause alone. I mention these points advisedly, because, though the importance of having such needles has been again and again insisted on, and is now well understood by many, yet bad needles not fulfilling the above indications seem to be in too common use. The needle also should pierce somewhat obliquely,—say at an angle of about 60° or 70° with the perpendicular;—if entering too vertically the aqueous more readily escapes afterwards, if too slantingly its corneal track is too long, and it works less easily in different directions, and not without stretching the corneal tissue. As it has usually to be introduced near the corneal margin, a direction thence to the opposite side of the pupil will usually have the right obliquity.

c. If any considerable part of the pupillary obstruction consist only of crumpled capsule without opacity, that part principally, if not solely, should be selected for operation: the point of the needle should pass to its further side, should cut it through in different directions without entering deeply into the vitreous humour, and should, so to say, comminute it, without any drag on the contiguous parts either of the capsule or iris. If a free opening be thus made it will be effective for a clear image, even though diffused shadows be still cast on the fundus by films of opacity in neighbouring parts of the pupil; and I would advise that no attempt be made in that case to remove such opacities, unless, being very brittle, they yield to a slight touch of the needle, or unless they occupy a considerable proportion of the pupillary area.

d. If it is desired to break through such denser or adherent films, which resist a single needle, the second one, held in reserve, is to be introduced with the other hand. The

first should have already cut across the film or separated it if adherent, in so far as it could do this without a drag on the iris or ciliary body, and the capsule has thus perhaps been reduced to one or two strings tougher than the rest. The second needle is then inserted in such a position as may best secure the rupture of these bands in the usual way, their points crossing, one in front, the other behind the band, and revolving a few turns round each other, and then perhaps being separated.

e. As it is of prime importance that this little operation should not be followed by iritis, it will be well to let any unavoidable drag upon the iris be a gradual one. This tissue will yield to a gentle continuous force, while one suddenly and roughly applied will do it violence, and excite it to inflame. The movements of the needles should therefore be slow, not jerky.

f. The vitreous humour should not be encouraged to come through the opening made in the capsule. To retain the aqueous and favour its speedy re-accumulation in the manner above alluded to is one means of ensuring this. Another is to avoid running the needles too deeply into the vitreous, or making too wide excursions there, so as to break it up. I think it often happens that this humour is more fluid in its axial region, behind the pupil, more consistent near the ciliary region. Wide excursions of the needle, pushing the pupillary margin towards the ciliary region, are apt to disturb this latter part of the vitreous, and cause it to press thence afterwards through the pupil, occasioning irritation of the iris by displacement, and sometimes consequent heightened globe-tension of the glaucomatous type.

g. Such glaucomatous tension is particularly apt to come on after needle operations following flap-extraction, where the pupil is small, and disposed by the integrity of the sphincter to remain small afterwards, as well as to suffer at the moment from the dilating force of the needles. It is very much less apt to ensue upon a similar proceeding following the traction method, and this indeed constitutes one of the subsidiary advantages of this latter method. Never-

theless a few words here may be added regarding it. I have formerly alluded to it in speaking of glaucoma (see "Brit. Med. Journal," Jan. 30, 1864, p. 135, and Teale, ibid., p. 404).

This glaucomatous hardness is by no means an indication or result of mere iritis. Considerable iritis may follow a capsular operation, and even last many months without any increase of tension: and, like ordinary idiopathic glaucoma, this glaucomatous state may commence without inflammation and remain long without pain, though it is far more commonly attended by both. It may come on within 24 hours after the needle has been used, but usually on or after the second day. The patient does not then see so clearly as immediately after the operation, the eye is a little hard (T1), it is perhaps hardly redder than natural.

Within 12 or 24 hours, perhaps in the night, ciliary pains in the brow or temple come on, and the eye is found still harder (T2 or T3). With the higher tension there is more injection, but chiefly of small ciliary vessels, and vision is more obscure, but on examination of the media there is little to account for this, the cause being, not their opacity, but compression of the retina. But probably the iris will be found more or less bulged forwards, showing accumulation of fluid behind it in a space not communicating through the pupil with the anterior chamber. Often this bulging is partial or unequal, occasionally the pupillary margin is thrown aslant by it. Whether the over-secretion indicated by the bulge, by its reaction on the other contents of the globe, is the sole source of the heightened tension, or whether, as I am rather inclined to believe, the displacement and stretching it causes in the iridial tissue becomes the excitant of the vascular nerves governing the secretion, according to the views of Professor Donders, it is certain that a puncture of the bulging iris with a broad needle, opening a communication with the anterior chamber, usually suffices to relieve the heightened tension, and to cause a subsidence of the rising inflammation. This therefore should be made at the earliest moment that

the globe is found to be too hard, at least if the hardness rises to T2, and persists after 12 hours from its commencement. Atropine should certainly be used, but it is often a mistake to apply leeches, or to trust to any remedy short of local relief by puncture; and if this be necessary, the sooner the better. For then all the secondary evils of the glaucomatous state may be averted, which otherwise may be expected to develope themselves sooner or later, according to the intensity of the inflammatory symptoms.

h. It is chiefly on account of the liability to this glaucomatous state that an eye should always be carefully watched for some days after the needle operation, and no premature use or exposure to light permitted. But by attention to the points of practice now insisted on, I think such state will be rarely excited, and that if at once recognized it may be readily relieved.

Proposals entitled to great respect have been made within the last few years, by one of which (that of Jacobson) the old flap-operation has been varied by the performance of an iridectomy after the flap has been formed and before the opening of the capsule, the intention being to facilitate the egress of the cataract, and to obviate the troubles of after prolapse of the iris. As no traction-instrument is here used, the flap must be large, and chloroform therefore is not prudently admissible. The operation too without chloroform is considerably complicated and prolonged by the iridectomy, as well as made more painful, and loss of vitreous is therefore prone to occur. I have performed it a few times, but have not been satisfied with it. Before the formal proposal of this as a method, I had now and then in flap-extraction excised iris after the extraction of the lens in cases where there was a strong disposition in the iris and vitreous to bulge and distend the flap; also where vitreous had already escaped I have removed a portion of the iris with advantage.

Another proposal (that of Von Graefe) has been to make an iridectomy as an altogether preliminary step, and to wait until the eye had recovered from this operation before

removing the lens, either by the large flap or by the smaller incision with the help of a traction-instrument. With respect to the former alternative (by the large flap), a preliminary iridectomy would no doubt disarm it of some of its attendant hazards, and chloroform may be given for the iridectomy, though not for the extraction. Probably such an extraction would be attended with more risk of loss of vitreous than the ordinary flap method, without iridectomy, but certainly the recovery from it would be on the average a safer one. With regard to the latter alternative (by the smaller incision and a traction-instrument), chloroform is admissible at both parts of the two-fold operation; but then it may well be questioned on what adequate grounds the patient is to be subjected to the inconvenience and anxiety involved for the most part in this double proceeding, when a single operation under chloroform, according to the method advocated in the present paper, will suffice.

On the whole, the experience I have acquired induces me to draw the following conclusions :—

1. The operation described may be applied to all cataracts of harder consistence than those which admit of being withdrawn through a puncture of the cornea.

2. The iridectomy, which is a necessary part of it, is no disfigurement, nor does it in any important degree affect the optical result.

3. This operation is superior to flap-extraction by being applicable under chloroform, by its diminished risks during convalescence, and by its greater average success, and by being now and then admissible where flap-extraction would be attended by so little prospect of advantage as to be hardly worth performing.

4. While therefore flap-extraction may still be preferable under certain circumstances, and while it may be open to the future to render its success more secure under various conditions, a general adoption of the traction method would be likely, at present, to add considerably to the percentage of cases of cataract in adults recovering sight by operation.

THE INJURIES TO THE EYES, TO WHICH ENGINEERS AND BOILER-MAKERS ARE SPECIALLY EXPOSED.

By George Lawson, F.R.C.S.,

Assistant-Surgeon to the Moorfields Ophthalmic Hospital, and to the Middlesex Hospital.

The mechanics in and around London who suffer most severely from injuries to the eyes, are the engineers and boiler-makers. The nature of their employment causes their eyes to be exposed to the constant danger of small particles of metal being driven against them with great rapidity, sufficient to inflict severe wounds on the part against which they impinge, and oftentimes with force enough to lodge them within the eye itself.

The minor accidents, such as the lodgment of minute particles of metal on the cornea, on the conjunctiva of the globe, or beneath the upper lid, are very lightly regarded by the men. In many cases the foreign particle is removed with a certain amount of dexterity by one of their fellow-workmen, but even these cases often baffle the skill of their experts, and men come daily to the hospital to be relieved of some foreign particle which has become impacted on the surface of the eye or the conjunctiva of the lid, the prolonged presence of which has been the source of an irritation often troublesome to arrest. But it is to illustrate the more severe class of injuries to which these men expose themselves that I quote the following cases, all of which have come under my care since last September:—

It is really distressing to witness the number of eyes which are lost yearly by some of the most intelligent of all our mechanics, and simply from the fact that they will not take the easy precaution of wearing a pair of protectors when engaged at work which jeopardizes the safety of their eyes. Experience is of little use in teaching them prudence,

for having lost one eye from an accident incidental to their employment, they often return to the same work as soon as they have recovered, without using any protection for their single eye, and in several instances they have been brought to the hospital after a lapse of time, with it also destroyed by a similar casualty.

The boiler-makers are more liable to accidents than the engineers, and they are usually of a more severe character. In striking hot rivets and in cutting cold ones, fragments of the metal become detached, and fly off with such violence as often to penetrate the globe, or to inflict on it an injury which is either irreparable, or else if the eye recovers, to leave it permanently a damaged organ.

I have lately had some efficient eye-protectors made by Mr. Pillischer, the optician, 88, New Bond-street, which may be purchased for the moderate sum of 5*s*. 6*d*. The only peculiarity about them is, that the glass front, instead of being of common glass, which is easily broken, is made of the best plate, $\frac{1}{16}$th of an inch in thickness; the glass face is larger than those commonly used by the men, so that the field of vision is scarcely interfered with, and the surrounding wire gauze is of the best material. They accurately cover the eye, and are maintained *in situ* by an elastic band around the head. They are efficient protectors, and would, if habitually worn by men who expose their eyes to constant danger, diminish to a very appreciable extent the number of eyes which are lost every year through the want of using this simple precaution.

Case I.—*Wound in the Sclerotic, close to the margin of the Cornea, from a fragment of iron detached from a rivet; extensive Prolapse of the Iris*; *Excision of the Eye three months after the injury.*

William R., æt. 53, a boiler-maker.—Came to the hospital on September 26, 1864, suffering from an injury he had received the day previously. Whilst cutting a cold rivet, a sharp-edged fragment of it flew off and struck the left eye, inflicting a wound in the sclerotic nearly a quarter of an inch in length, close to the lower and outer margin of the cornea.

State on Admission.—The anterior chamber full of blood so as to prevent any of the deeper parts being seen. Through the wound above indicated there was an extensive prolapse of the iris, which was jagged and torn. It was also probable that vitreous had been lost, as the eye was very soft. The protruded lacerated portion of iris was removed with a pair of scissors, a cotton-wool compress applied to the eye, and two leeches to the temple, to be repeated if necessary; and a belladonna lotion was ordered to bathe the eye with three or four times a-day.

September 30th.—A large part of the blood in the anterior chamber has been absorbed, and it is now evident that there has also been extensive posterior hemorrhage. A small portion of opaque lenticular matter remains, but the great bulk of the lens appears to have escaped at the time of the injury. The eye is much inflamed, with chemosis of the conjunctiva.

Repeat the leeches to the temple.

From this date active inflammation gradually subsided, but all sight was lost, and in about six weeks, he was able to leave the hospital.

In January of this year he was re-admitted into the hospital, the lost eye had become inflamed, and was giving him pain. It was quite blind, and had commenced shrinking. It was very soft, and smaller than the sound eye. I advised him to have it removed. He consented, and I accordingly excised it.

On making a section of it the following was the condition. The lower and outer third of the iris was gone. There was no lens, but an opaque film remained, which was united to the posterior surface of the iris. There was no vitreous, but the retina was entirely detached and coarcted, fastened posteriorly around the optic nerve, and anteriorly adherent to the back of the iris. The space between the retina and choroid was filled with a yellow serous fluid. The choroid was *in situ* throughout, and in contact with the sclerotic, except at several points where small blood clots separated them.

CASE II.—*A large piece of iron, the fragment of a rivet, lodged in the Eye, followed by sloughing of the Cornea.—Excision of the Eye.*

Joseph M., æt. 26, a boiler-maker, came under my care at the Ophthalmic Hospital on November 27, 1864, on account of an

injury he had received a few hours previously to the right eye. Whilst cutting a cold rivet, a fragment of it flew off and struck the right upper lid, making a vertical cut, a quarter of an inch in length, extending through its cartilaginous border, and inflicting on the eye a vertical wound, involving the two upper thirds of the cornea, and running the eighth of an inch through the sclerotic into the ciliary region. The man was first seen by the house surgeon, who brought the edges of the wound together with a fine pin and twisted suture, and closing the lid, applied over it a cotton-wool compress and bandage, and ordered two leeches to the temple. The man had an impression that the piece of iron which struck his eye was a large fragment, judging from the surface of the rivet from which it had been splintered, and concluded that after inflicting the wound it had glanced off.

Three days after the injury there was great chemosis of the conjunctiva, the cornea looked steamy and opaque, but the eye was not very painful; the large wound of the globe had not closed, and the continued escape of aqueous kept the eye quite soft. The edges of the lid had perfectly united and the needles were removed.

December 3rd.—The eye has progressed very unfavourably; the cornea has sloughed. I strongly advised the man to have the eye removed, as it was now useless, and it was also very probable that a chip of metal was buried in the globe, which might be the cause of great suffering and annoyance hereafter.

December 7th.—I removed the globe, and afterwards, on making a section of it, the following was found: Extensive hemorrhage had taken place between the choroid and retina, the latter being almost completely detached, except at one part of the fundus, where, lying upon it and imbedded in a mass of lymph, was a large fragment of iron, of the shape and size represented in the wood-cut.

The man did well, and in four days left the hospital.

CASE III.—*Wound of the Eye and upper Eyelid with a fragment of steel.—Lodgement of the foreign body?*

A. C., æt. 27, works at a ship yard at Greenwich. He came to the hospital on December 2nd, 1864. The history of this accident is as follows: Yesterday morning, whilst his mate was striking a piece of steel, a fragment of it flew off and struck the right eye. It first passed through the upper lid close to the tarsal edge, and at about its centre, and then penetrated the sclerotic coat.

Present State.—There is a wound in the upper lid, and another in the sclerotic, at a point exactly corresponding. There is no orifice of egress. The evidence is therefore strongly in favour of the piece of metal having lodged in the eye. Directly after the accident he found that he was quite blind.

The pupil is widely dilated. Ordered two leeches to the temple, and a fold of wet linen to be laid over the eye.

December 3rd.—Has passed a good night. Says he has no pain in the eye.

December 5th.—The eye is tolerably quiet; the pupil widely dilated. A clot of blood may be seen lying behind the lens. He says that in the upper and outer part of the field of vision he has just perception of light.

He continued as an out-patient at the hospital until the 13th of the month, when he ceased his attendance. The importance of carefully watching the eye was urged upon him, and the necessity of having it removed if it gave him the least annoyance, as there was every reason to believe that a foreign body was within the eye.

CASE IV.—*Burn and Wound of the Cornea from a blow with a piece of hot steel, accompanied with Prolapse of the Iris and Cori Dialysis.*

J. G., æt. 39, an engineer, applied to the hospital in December 16th, 1864, on account of an injury he had received to the right eye the previous day. Whilst hammering a piece of steel about 8 inches long, to lengthen it, it dropped out of the tongs just as the hammer fell upon it, and flying up, the hot end of it struck the eye. There was an oblique wound, extending from the upper and outer margin of the cornea obliquely inwards, passing

along the upper edge of the pupil; a small piece of iris was detached from its circumferential border, and prolapsed through the wound. The cornea in the immediate site of the wound was whitened, and had lost its glistening character from the burn inflicted on it at the same time by the hot steel.

The prolapsed iris, which appeared contused and torn, was snipped off with a pair of scissors; a cotton-wool compress and bandage was applied to the eye, and two leeches to the temple.

December 20.—Doing well. The wound in the cornea has united, the aqueous has been resecreted, and there is a good anterior chamber. The burnt portion of the cornea is recovering. To use a belladonna lotion, and continue the compress.

December 24. — The cornea is fast clearing, but still the opacity is sufficient to prevent a satisfactory examination being made to determine the exact amount of injury to the parts within.

The man continued to progress favourably; the cornea became clear, except in the line of the cicatrix, and on February 24th he ceased for a time his attendance at the hospital. The eye was then in the following state: The upper border of the pupil was tacked up to the cicatrix in the cornea, but its lower margin was free and acted well. Above the cicatrix was a small triangular clear space, showing the extent of iris which had been detached from its ciliary border. The lens was very cloudy. The sight of the eye was consequently very dim, and he could only just make out large objects.

Case V.—*Blow on the Eye, causing dislocation of the lens backwards into the Vitreous, and extensive Intra-ocular Hemorrhage; Complete Loss of Sight; Excision.*

Wm. C., æt. 29, an engineer, came to the hospital under my care on March 3rd, 1865. His story was that on the day previously he was grinding out the quadrant wheel of a locomotive engine, when the emery wheel broke, and a piece of it struck his left eye, but first cutting through the integuments and cartilage of the upper lid. He was immediately seen by a surgeon, who brought the edges of the lid together with a suture, and applied leeches to the temple.

When I first saw him there was great œdema of the upper lid

and chemosis of the conjunctiva, so that it was impossible to determine the exact amount of injury the eye had received. He was ordered to repeat the leeches to the temple, and to keep a wet fold of linen over the eye.

March 7th.—The swelling of the lid and chemosis of the conjunctiva having greatly subsided, the eye can now be seen. The blood which had evidently filled the anterior chamber is now nearly absorbed. The iris is detached from its great circumference to nearly two-thirds of its extent, and is thrown backwards. The lens is dislocated backwards into the vitreous, and may be seen waving about with each movement of the eye, but suspended by some filmy threads of the suspensory ligament which still remain attached to it. He has no perception of light with the injured eye. As the eye was quite destroyed, and he was complaining of the other feeling irritable, I strongly urged him to have it removed. He consented, and on March 11th I excised it. Examined after removal, the following was the condition: There is a jagged and contused wound at the upper part of the cornea, but it does not penetrate. On making a section of the globe, a great quantity of yellow serous fluid escaped in the place of the vitreous, but healthy vitreous of normal consistency was still in contact with the retina, and around a portion of the ciliary processes. There had been hemorrhage into the vitreous from the ciliary processes. Lying loose in the vitreous, but suspended by a few filaments from above, which prevented it resting on the fundus, was the lens in its capsule entire, but very cloudy, and around it at the lower portion of the eye, were films of lymph. A large piece of iris separated from its ciliary attachment, was floating loosely. The choroid and retina were *in situ*, except at the lower and outer part, where a blood clot separated them. There were also numerous small extravasations of blood between the choroid and sclerotic.

The case did well.

CASE VI.—*Blow on the Left Eye by a fragment of a rivet, followed by Cataract. Eight years after, a blow in the Right Eye with a pair of hot tongs, in having a rivet handed up to him.*

J. B., æt. 36, a boiler-maker, came to the hospital on March 17th, 1865, on account of an injury he had just received on the

right eye from a blow with a pair of hot tongs, whilst a hot rivet was being handed to him. There was an abrasion of the cornea, and consequent photophobia and lachrymation. The eye was much inflamed and very painful. The man was very anxious about the accident, as eight years previously his left eye had been struck with a fragment of a rivet, and since then it had been useless to him. On examining the eye, it was found that a cataract had followed the first injury, and that nearly all the lenticular matter had been absorbed, but some still remained enclosed in a dense capsule, which occupied the pupillary area. He had good perception of light, and an active pupil.

The man was admitted into the hospital, and after treating the primary injury to the right eye, for which he applied, the cataract in the left eye was dealt with, and a very good result followed.

Case VII.—*Rupture of the Globe in a line with the lower margin of the Cornea; Protrusion of the whole Iris; Posterior Hemorrhage—Excision.*

Fredk. F., æt. 34, a boiler-maker, was brought to the hospital on March 28th, 1865, having one hour previously met with a severe injury to the left eye. He says he was driving a steel cotter through a pin to fasten two iron plates, when the cotter flew out and struck the left eye.

State on Admission.—The globe collapsed more than one-third. There was a wound nearly three-quarters of an inch in length in the horizontal diameter of the eye, running along the lower margin of the cornea, which it had entirely detached from the sclerotic, and extending inwards towards the caruncle for nearly a quarter of an inch through the ciliary region. Protruding from this wound, and hanging loosely, was the entire iris. The collapsed state of the eye indicated that there had been great loss of vitreous. The anterior chamber was filled with blood. The eye was irreparably lost. This being the case, I strongly urged the man to have it removed; and having gained his consent, I at once excised it. On examining it afterwards, the following was the condition. There was a wound in the eye, as indicated above. The whole iris was prolapsed, having been torn from its ciliary attachment. The lens was also gone, and at least two-thirds of

the vitreous had escaped. The anterior chamber was filled with blood. The retina was detached entirely except at the optic nerve and ora serrata, and bulged forward by a large clot of blood between it and the choroid, which was *in situ* with the sclerotic.

CASE VIII.—*Lodgment of a Chip of Metal in the Right Eye three years ago—Complete Loss of Vision—Recurrences of Inflammation—Sympathetic Irritation of the Sound Eye—Excision of the injured one—Good result.*

Leonard S., æt. 16, works at iron shipbuilding and boiler-making. He applied to the hospital April 18th, 1865, on account of the continued pain in the right eye, which he had suffered from an injury three years previously. All sight was gone; he had not even perception.

He stated that three years ago his mate was knocking in a cotter to draw together two iron plates, when a fragment of it flew off and struck the right eye, and, he thinks, entered it. Very shortly after the accident he was quite blind with that eye. He has suffered from repeated attacks of inflammation; and although the eye is more quiet, he says he has always pain in it, and that the sound eye is becoming affected. When he attempts to read the sound eye waters, and the type soon becomes confused, and he is obliged to desist. It always feels weak, and he is unable to use it much by candle light or in any strong glare.

State of the Injured Eye.—The eye is smaller than the sound one. It is perfectly quiet, and at present free from irritation. The cornea is clear, and there is a deep anterior chamber, but the aqueous is yellow and serous. The lens is cataractous, and the pupil adherent to its capsule. The eye is very soft, — T 2, and shrunk to about one-sixth.

As the eye was a lost and shrinking one, always painful, liable to recurrences of inflammation, and acting prejudicially on the other, I advised him to have it excised, particularly as there was reason to believe that a foreign body was lodged within it. He consented, and I accordingly removed the eye.

An examination of it afterwards showed the following condition. In the sclerotic, one-eighth of an inch from the outer border of the sclerotic, was a small puckered cicatrix. On making a section

of the globe through the optic nerve, the choroid was seen lying in contact with the sclerotic, but the retina was entirely detached, adherent only at the optic nerve and at the ora serrata, and the space between filled with a yellowish limpid fluid. The lens opaque. The ciliary processes on the inner side of the eye, and opposite to the cicatrix in the sclerotic, were coated with lymph, and lying buried in them was a small scale of metal. At the cicatrix of the sclerotic, the choroid and a portion of ciliary processes were firmly adherent. All vitreous had disappeared except a small portion, which seemed to hang as a film around the ciliary processes.

A CASE OF DISLOCATION OF THE LENS INTO THE ANTERIOR CHAMBER; EXCESSIVE PAIN TWO YEARS AFTER THE INJURY, AND LOSS OF SIGHT; EXTRACTION OF THE LENS, FOLLOWED BY IMMEDIATE POSTERIOR HEMORRHAGE.

By George Lawson, F.R.C.S.,

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Richard W., æt. 55, a wheelwright, applied to the hospital on April 21, 1865, on account of the excessive pain he suffered in the left eye, which had been injured by an accident two years previously, dislocating the lens into the anterior chamber.

His story was—Two years ago he was working at a steam-sawing-machine, and was engaged feeding the saw, when a piece of wood jumped up and struck the eye, dislocating the lens into the anterior chamber. For some time after the accident he suffered great pain, and lost nearly all sight, but retained sufficient for twelve months to be able to guide himself about with that eye. Since that period he has only been able to see shadows. In March of this year the eye began to trouble him severely, and since then he has suffered so much pain in the eye that he came up from Malton to the hospital for the purpose of obtaining relief, and was willing to submit to any treatment which would afford it to him.

Present state.—The globe is much injected; the sclerotic of a dingy colour, with enlarged ciliary veins. The tension of the eye is + T 2. A completely opaque lens in its capsule entire is lying in the anterior chamber, pushing the iris backwards. The pupil is widely dilated, so that a mere rim of iris can be seen. He says he has perception of light; but from a careful examination it must be very slight, as he is unable to tell with any certainty whether the eye is shaded or not, although he contends that with that eye he could point out the window of the room. The man was naturally anxious to save the eye if possible, but he was willing at the same time to submit to any operation to gain relief from the pain he had lately been suffering. Although the eye was evidently very unsound, and in a state of glaucomatous tension, I determined to extract the lens, and to be guided by what followed

as to what other treatment should be adopted, as, if this failed, the last resource—the removal of the eye—could be performed.

The man was admitted as an in-patient, and I extracted the lens by an upper section. It came away readily in its capsule, but a quantity of perfectly fluid vitreous escaped with it. He immediately complained of agonizing pain in the eye, and in a few minutes the whole globe was filled with blood. It was evident what had happened. The sudden alteration in the tension of the the globe by the removal of the lens and partial escape of the fluid vitreous had deprived the vessels of the choroid (probably already weakened by disease) of their support, and becoming thus overdistended, some of them had given way, and extensive hemorrhage had ensued. I determined, therefore, at once to remove the eye, and save the poor fellow a long and painful course of suppuration. For this purpose he was put under the influence of chloroform, and the eye removed. On making an examination of it immediately afterwards, the following was the condition: The hemorrhage had taken place from the vessels of the choroid, and blood had been poured out between it and the sclerotic, sufficient to detach the entire choroid from the sclerotic. The retina was in close contact with the choroid, but of course carried forwards with it. The whole of the fluid vitreous had been squeezed out of the eye by the blood clot.

This case is specially interesting as illustrating two important facts. 1st. The danger of leaving a dislocated lens in the anterior chamber. In its new position it acts as a foreign body; and although in exceptional cases it may not produce much irritation, yet, in the majority, loss of sight and destruction of the eye is the result. Like a foreign body it may remain for a time without giving rise to any dangerous symptoms, but its presence in the anterior chamber pressing upon the iris, keeps the eye in constant jeopardy, as, sooner or later, it is almost certain to kindle an inflammation, which must end fatally. 2nd. It confirms what was, I believe, first pointed out by Mr. Hulke, viz., that hemorrhage immediately after the extraction of the lens in an unsound eye, takes place from the posterior choroidal vessels, and that the blood clot is between the sclerotic and choroid.

A GROUP OF CASES ILLUSTRATING THE OCCASIONAL CONNEXION BETWEEN NEURALGIA OF THE DENTAL NERVES AND AMAUROSIS.

By Jonathan Hutchinson, F.R.C.S.,

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Remarks on a parallel between the disease known as Infantile Paralysis and certain forms of Amaurosis.

As to the true cause of infantile paralysis, we as yet know little or nothing. The clinical facts respecting this not infrequent disease are, however, well recognised. It will be generally admitted that it is not uncommon for a child to go to bed perfectly well, and to get up in the morning paralysed; it may be in one limb, or in only one muscle; it may be in a group of muscles, or in several limbs. In some cases the paralysis is complete, in others it is imperfect. In most there is some improvement during the early periods, but rarely perfect restoration, whilst in many cases permanent and complete paralysis results. Sometimes epileptiform convulsions occur, but in many of the best marked instances the child never has any kind of fit, and, in fact, appears both before and after the occurrence of the paralysis to be in good health. No pain attends the paralysis, nor is there the slightest indication of cerebral inflammation. The affection is most arbitrary as regards the parts it implicates, not unfrequently the extensor muscles of the leg, causing talipes-equinus, in other instances the muscles of the calf; sometimes the deltoid alone, and now and then the quadriceps extensor. I have recently had under care several well-marked instances of absolute paralysis of the latter muscles with the history of sudden occurrence in early life.

These cases of infantile paralysis occur chiefly during the period of dentition, but not by any means invariably so. Sometimes they appear to be connected with the presence of worms, but often there is no proof of such complication.

Certain cases of amaurosis appear to me to bear a very close resemblance to infantile paralysis. Without any warning whatever, without any other cerebral symptoms, a patient loses the sight of one eye; now and then, but only very rarely, of both. In some cases there is a certain amount of improvement afterwards, but often the amaurosis is total and permanent. In some instances the optic disc becomes white and atrophic, but in others it retains an almost normal vascular supply. Most of the subjects of these cases which have come under my notice are women. In some there is evidence of cardiac disease, but in others there is not, and in most I have found the arteria centralis of good size, so that the hypothesis of embolism seems to have but little support.

In several of the best-marked cases that I have seen there was the history of neuralgia in the face for long periods before the amaurosis, the neuralgia being usually connected with toothache. I am quite alive to some of the sources of mistake which attend the attempt to prove the occurrence of paralysis from reflex irritation consequent on a peripheral cause. Chief amongst them we have, of course, the possibility that the neuralgia itself may have been due to central disease, and that the extension of the latter may have implicated other nerves.

I must leave the following cases to make their own impression on the mind of the reader. Whilst endeavouring to avoid forming hasty opinions, I may still venture the practical remark that I believe we pay far too little attention to the state of the teeth as possibly productive of disturbances of function or of nutrition in the eyeball, or even in the cerebral centres of vision.

Whether, as ophthalmic surgeons, we may incline to admit or deny the connection between dental irritation and amaurosis, we must certainly grant that very curious facts are extant, and quite sufficient to make the removal of all possible sources of annoyance to the fifth nerve a precaution well worth adoption. At any rate I can speak from my own

experience most strongly as to the advantage often obtained from attention to these parts. In many of the cases of so-called "strumous ophthalmia" in young children, in which small ulcers on the surface of the cornea or near its edge are attended by great intolerance of light, lachrymation and pain, the use of the gum-lancet at once relieves the more urgent symptoms. In the case of adults, it is surely the duty of our profession to take every opportunity of spreading information as to possible ill consequences of retaining stumps in the jaw.

Looking at the matter from a wider field of view, and remembering the frequent production of cancer of the tongue, cheek and gums by broken teeth, and how decayed stumps often become the cause of neuralgia of the most obstinate character, we shall become yet more deeply impressed with the importance of the recommendation.

In many instances in which the fifth nerve is rendered irritable by a carious stump, the patient is not aware that the stump is the seat of pain. Of this a good example came under my notice a few months ago.

Neuralgia of the Eyeball, cured by the Extraction of a Stump.

Mrs. Higdon, aged 28, a woman who was somewhat enfeebled by nursing, came to Moorfields on January 15, stating that she could not see with the left eye. I found that for a month past she had suffered from pain in the eyeball, and in the forehead. The pain was severe at times, but not constant. It was clearly of a neuralgic character. The eye was watery and irritable. It was intolerant of light, and she could only read large capital letters. The intolerance of light was such that I could not well test her power of vision. She said she had no toothache, but on examination I found a carious molar in the upper jaw, which was tender on pressure. I desired her to have this removed. She did so, and returned to me a week later in great delight at having completely got rid of her symptoms. The eye was no longer irritable; she had no intolerance of light; and she could read well. She stated that all pain in the forehead and eye ceased immediately after the extraction of the stump.

Failure of one Eye in connexion with Toothache, and long-continued Irritation of the Gum—Partial Recovery of Sight after extraction of a Stump—No changes in the Fundus of the affected Eye.

Mrs. S., a Norwegian lady, aged about 45, stout, florid, and in good health, was sent to me by Dr. H. Weber, on account of a tumour which was developing in connexion with her left masseter. About the exact nature of the tumour there was much doubt. I found that she was almost blind of her left eye. The globe also diverged considerably. As to the loss of this eye, she gave me the statement that she suffered about three years ago from a swelling of the right upper gums. For this leeches were repeatedly applied. She had at times much pain in it. Rather suddenly the left eye became blind. She herself blamed the repeated application of leeches to the gum. A little after this she had the stump of a tooth taken out, and forthwith the enlargement of the gum disappeared. The eye gradually improved a little, but she never became able to see more than the largest objects. On ophthalmoscopic examination, I could detect nothing abnormal in the fundus of the affected eye. The disc had a good degree of colour. There was no cupping, and the globe was not hardened.

Toothache and Neuralgia of the Face—Sudden permanent and complete Loss of Sight in the Right Eye ten years ago—Continued liability to Neuralgia—Two transitory attacks of Complete Blindness in the Left Eye recently.

Mr. Holt, of Hitchin, brought to me the subject of the following case for consultation, on account of her sight:—

Miss —— is a lady of about 40, and in tolerable health. Ten years ago she suddenly lost the sight of her right eye. She tells me that she had suffered from toothache and general faceache for some time previously, and that one morning, on awaking in bed, she was greatly alarmed to find something wrong with her sight. At first she thought that she could not open her right eye, but on getting up and going to the glass she found that it was open, but totally blind. She is sure that there had been nothing amiss with this eye previously. If there had been, she says she must have noticed it, since the moment she awoke her attention was called to the fact that she could not see well. After this sudden failure of the right eye, it never in the least

improved, and she has at present no perception of light whatever with it. During the ten years which have since passed, she has repeatedly suffered from toothache on both sides, and also from neuralgia, affecting various parts of the face--the forehead, and often also the eyeballs themselves.

She does not describe these attacks of neuralgia as having been extraordinarily severe. The left eye did not suffer, and until about a fortnight before Mr. Holt brought her to me she enjoyed perfect sight in it. One afternoon, about a fortnight before she came up to town, she was sitting talking to a friend, when suddenly she found herself in total darkness. She had not suffered from any headache just before, nor did she feel either sick or giddy. In a minute or two she became able to see the floor, and during the next five minutes she gradually regained her sight, from below upwards, until it was almost as good as before.

Exactly a week later a similar attack occurred, and passed off as the first had done. The only permanent symptoms were several small muscæ, and the perception of halos around flames. She had also considerable aching pain in both globes.

When I saw her (February, 1865) her sight with the left eye was almost perfect, making allowance for a slight degree of hypermetropia. With the ophthalmoscope I could not discover any abnormal condition whatever in this eye. The arteria centralis retinæ was of average size; there was no trace of cupping. In the other eye the optic disc was oval, with the long axis from above downwards. It was abruptly margined, and very white. No trace of colour could be observed on its surface. Both the central artery and vein were somewhat diminished in size, but not much. The artery could be easily traced. There was no cupping of the disc, nor any evidence of disease of the choroid.

On examination of Miss ——'s mouth, I found, on the left side, some broken stumps of teeth, but none of them were specially painful. I advised her to have the whole of these removed, and to take quinine. Miss —— had never had a fit, nor had she presented any symptoms of cerebral disease other than the loss of sight. Since the right eye had become blind, it had converged to a very decided squint. The pupils of both were rather large, but not particularly so. There was no evidence of disease of the heart. I could not detect any murmur.

The theory of embolism of the retinal artery is, in this case, put out of question by the fact that this vessel, both in the blind eye and the other, is still of good size. It is possible, however, that embolism might have occurred in the arterial trunk supplying the cerebral origins of the optic nerves (corpora quadrigemina, &c.). Such an occurrence might possibly have explained the loss of the first eye, which was permanent, but it could scarcely do so as regards that of the second, in which two transitory attacks have occurred. We cannot, moreover, explain the occurrence of complete blindness of one eye whilst the other continued perfect, on any other hypothesis than that the influence producing it was brought to bear anterior to the commissure.

Repeated attacks of severe Neuralgia in the Face—Sudden occurence of Complete Amaurosis after a night of severe pain—Slight Recovery of Sight.

Mrs. L——, aged 58, was sent to me by Mr. Biddle, of Edmonton, in the early part of January of the present year.

She had the aspect of complete amaurosis, both pupils were considerably dilated. I supposed, at first sight, that she must have been long blind, but was told that she had become so suddenly on the previous Sunday morning. On examination I found that she was not absolutely blind, but that when seated quietly she could make out letters of No. 16, holding the page on one side and puzzling out letter by letter.

I obtained the history, that for ten years past she had been liable to neuralgia. Ten years ago she consulted Mr. Wordsworth for a severe attack in which the left eyeball was involved, and obtained great benefit from his prescription. After this she continued a very active life, but still every now and then suffering from her old enemy. Two months ago she had a very violent attack, more severe than any preceding ones. The pain began in her left cheek, she thought from a tooth, and darted up into the eye, forehead, and nose. It was exceedingly severe. Her eyesight was not in the least affected, and, although unable to sleep at night, she still kept to her duties as manager of a boarding-school. After about a week she got pretty much rid of the pain, but still it would recur occasionally.

On Saturday January 14, in the evening, the pain came on very violently in the right eye and supra-orbital region. She had

a bad night but got up at the usual time. She had felt sick and rather faint, but there had been no vomiting. Whilst sitting at breakfast on Sunday morning she put up her hands to her eyes remarking, "What a night I have had with the neuralgia in my eye," on taking her hands off she was horror-struck to find that she could not see them. For about five minutes she was in total darkness, and then she began to be able to distinguish those who were about her, after that her sight improved until she could see single very large capital letters, and at this point it remained until the day she came to me.

When Mrs. L—— came to me, on Wednesday January 18, she was in the condition above-described, almost blind, with dilated and sluggish pupils. On examination with the ophthalmoscope I could detect no change whatever. The media in both were perfectly clear, the optic discs and retinæ were well supplied with blood. Mrs. L —— was a florid woman, apparently in good health, but she had an intermittent pulse, and there was a loud mitral regurgitant bruit. The second sound was clear. The heart beat violently, and was evidently hypertrophied. On inspecting her mouth I found in the right side a molar, the fangs of which were inflamed and loose. This I removed, its fangs were discoloured and green. No cerebral symptoms had attended the amaurosis, and, excepting from distress as to her state, Mrs. L.—— appeared to be in usual health. The neuralgia was much less than it had been, but not wholly absent.

A week later Dr. Hughlings Jackson joined Mr. Biddle and myself in consultation on this most interesting case. The symptons had not materially altered; Mrs. L—— had come a distance of ten miles to my house without inconvenience, she had no cerebral symptoms excepting the blindness. We again used the ophthalmoscope, and with the same negative result as before. No improvement had followed the removal of the tooth. We agreed to try the effect of a course of arsenic with bromide of potassium.

Amaurosis, with White Atrophy of the Optic Nerves, rapidly progressive in a man who had suffered from Infantile Paralysis, and who was also a liberal smoker.

Thomas Taylor, a stout, robust-looking man, aged 36, a country hawker. He is now (January, 1865) only just able to distinguish light from darkness with his better eye (the left), and with the right can see nothing.

In both eyes the optic discs are of blue white, abruptly margined, and, from their extreme pallor, very conspicuous. The larger branches of the arteria centralis in the left eye are almost of normal size, but all the minute ones are absent. In the right the branches of the arteria centralis, though much diminished in size, are still easily traced. In both, the veins are of nearly normal size, those in the left being larger, and those in the right smaller than natural. Nothing unusual in the state of the media, or in that of the choroid.

He considers himself in excellent health, and states that he was so when his eyes first began to fail. The first symptoms were noticed in August last, when he found his sight a little dim. In the evenings when out with his cart he found that just as dusk drew on he became quite unable to see, and all was suddenly dark. In bright light he could still see fairly. This nyctalopia appears to have been a very marked symptom. At this time he was, as usual, out all day in the open air, and had an excellent appetite.

He had no cause of mental anxiety, and had no head symptoms, if we except a slight frontal headache now and then. He was not unduly sleepy, and never felt giddy. From the age of 19 he had been accustomed to smoke, and usually consumed about half an ounce a day. He drank beer moderately. He is a married man, with a family, and of steady habits. He looks older than his real age, and already is becoming grey.

He is the subject of talipes equinus of the right leg, and of some weakness of the left arm, both consequent on infantile paralysis at the age of four years.

In November last, on medical advice, he left off smoking, and has since smoked but very little. The eyes have, however, steadily got worse.

Both pupils are quite motionless, and of medium size, not dilated in the least.

This case coincides very closely with what we often observe in that form of amaurosis which is supposed to be connected with tobacco. The progress of the disease has, however, been more rapid than is usually noticed in such, and I am unwilling, in the endeavour to elucidate this obscure disease, to overlook the fact that in childhood the man had suffered from another and an equally obscure form of nerve disorder.

OBSERVATIONS ON DEFECTS OF SIGHT IN DISEASES OF THE NERVOUS SYSTEM.

By J. Hughlings Jackson, M.D.

Assistant-Physician to The National Hospital for Epilepsy and Paralysis, and to The London Hospital.

The physician is quite as much indebted to Helmholtz as the ophthalmologist. Defects of sight of all kinds occur so often in affections of the nervous system that it is not too much to say that to the student of these diseases a knowledge of amaurosis, both in the widest and loosest, and in the narrowest and most precise use of the word, is of more importance than a knowledge of any other class of symptoms. A full consideration of amaurosis (using the word for awhile in the meaning it had before Helmholtz discovered the ophthalmoscope) would draw me into writing on a subject almost as wide as Diseases of the Nervous System. We meet it with groupes of symptoms indicating disease of almost any part of the nervous system. It occurs with hemiplegia, epileptiform convulsions, paraplegia locomotive ataxy; with hydrocephalus, with loss of smell and loss of hearing, with paralysis of nearly any one of the cranial nerves. In these cases the amaurosis is generally, on ophthalmoscopic examination, found to be of one of the varieties to be presently described; but although occurring with disease of the nervous system, it often turns out to be but a local sign of some particular cachexia, or but a part of wide tissue degeneration:—Thus it reveals syphilis, Bright's disease, &c.

It is then perfectly clear that I must, as a physician, think of amaurosis rather widely. Indeed, I wish to repeat what I said in a former communication—that I write as a physician, and not as an ophthalmologist. I hope this will be remembered if I am thought to treat amaurosis too diffusely in its general bearings as a symptom, or less precisely in its special one as an eye-disease. To expect from a

physician a wide and advanced knowledge of a department of medicine now so special and so rapidly advancing as ophthalmology, would be, to expect what is impossible. My object in writing this article is simply that I may contribute from my own field of clinical work a few observations on a class of symptoms, the meaning of which it is most desirable to make out for the sake of advancing our knowledge of diseases of the nervous system. This renders it necessary that I should address myself both to the ophthalmologist and to the general physician, and thus I run a double risk of criticism. If, in the slightest degree, I do something towards bridging over the special, and perhaps somewhat isolated, department of ophthalmic medicine with the more general one, I shall have done all I wish to do. Here I would refer to most valuable work in this direction by my friend Dr. Russell, of Birmingham (see "Med. Times and Gazette," vol. i, 1863, p. 534; and "Brit. Med. Jour." vol. i, 1865, p. 187).

Amaurosis from Disease of the Central Nervous System invariably Double.

In this part of my paper I do not speak of amaurosis from all sorts of deep changes in the eye, from such causes for instance, as apoplexy of the retinæ, or choroiditis, or from embolism of the arteria centralis retinæ. Blindness from the last cause, so far as I know, occurs in but one eye. Of course the arteria centralis might be plugged on each side, but this would be a mere coincidence, and not a likely one. The kind of amaurosis which we most frequently find with disease of the central nervous system is, in my experience, invariably double, although one eye may suffer before the other. I do not say that blindness of one eye does not occur *with other symptoms* of disease of the nervous system, but that it does not occur from disease of the brain-mass. I quote the following from a paper I have published in the "Medical Times and Gazette:"—

"A young healthy patient is struck on the head, becomes very deaf, and has afterwards blindness of the right eye, paralysis of the right third nerve, and of the fourth nerve. The optic disc is white and glistening. Again, a young and healthy patient is struck on the head, has discharge of blood from the ears (but no deafness), and from the nose. He is left for dead. He gets rid of the severe symptoms, but is amaurotic of the right eye."

The above two cases I saw with Dr. Rooke, of the *Dreadnought*. It is quite clear that the disease was at the entry of the nerves, into the orbit. Here unilateral amaurosis occurs with other symptoms of disease of the nervous system, but from injury to nerve trunks, and not to nerve centres. When I come to speak of blindness with hemiplegia, I shall dwell further on this part of the subject, but it is important now to keep in mind the fact that blindness of one eye only is rare with hemiplegia. Yet although blindness of one eye is a rare complication of hemiplegia, it does now and then occur; but it is not, I believe, a consequence of the lesion of the hemisphere producing the hemiplegia as double amaurosis is. Of course I put quite out of question cases in which there is obvious organic disease in the eye from accidental or quasi-accidental causes. I have not yet seen the ophthalmoscopic signs of neuritis in *one* eye only in a case of hemiplegia or in a case of disease of the hemisphere.

In making inquiries of patients on this matter, we should be deceived if we took their answers absolutely. I have now under my care, at the Hospital for Epilepsy and Paralysis, a patient (kindly sent to me by Mr. Paget), whose case illustrates this well. He has the ophthalmoscopic signs of atrophy of each optic nerve consequent on neuritis, and hemiplegia on the left side. These followed an injury to the head on the right side. There is a great gap in his skull, and the hemisphere under it is, beyond all question, much damaged. Now, this patient, when asked about his sight, says that he is blind of but one eye. He is frequently asked, as there seems to be an impression that blindness, when it

is single, should, for physiological reasons, occur on the side of the body paralysed. The fact is that this patient cannot see at all with one of his eyes, and the sight of the other is not very bad. He can find his way about, but he cannot read. Sometimes, as in this case, the better eye is on the side of the cerebral lesion, but in others on the side of the paralysis.

This case shows that if we were to pay but a passing attention to defects of sight in investigating diseases of the nervous system, we should be likely to to get very wrong histories, and a post-mortem examination might then be rather mischievous than useful. Sometimes, however, there is atrophy of one optic nerve with hemiplegia, and it may be argued that this is due to the lesion which produces the hemiplegia. I cannot demonstrate that it is not, but in the three cases I have seen, it seemed more probable that it was due to embolism of the arteria centralis retinæ. The atrophy was not of the kind that follows neuritis.

The following case, quoted from a paper on "Loss of Speech" in a volume of Reports, by the Staff of the London Hospital, is of interest as regards sudden amaurosis of one eye, and hemiplegia. The amaurosis came on two years before the hemiplegia, and was, from its suddenness and from the existence of heart disease, doubtless due to embolism of the ophthalmic artery or of the arteria centralis retinæ :—

Case I.—*Sudden Amaurosis of the Right Eye.—Two years later, sudden Hemiplegia on the left side, with no loss of Speech—Mitral disease.*

Francis F., aged 63. He came to me, at the Hospital for Epilepsy and Paralysis, on account of giddiness, Oct. 21st, 1863. He had, I found, lost the sight of the right eye, two years ago, suddenly. The optic disc was very white, and the arteries small; the veins seemed about the same size as those of the opposite eye. There was a harsh systolic murmur

heard over the apex of the heart. There was a large arcus senilis, but no albumen in the urine. The radial arteries seemed large, and felt rather rigid.

A few days after I saw him, he suddenly dropped down. He was not insensible, and knew what was going on, but the left arm and leg were paralysed. His articulation was bad, but his expressions were accurate. He recovered the hemiplegia in a few weeks, and when I saw him again, a few months later, he was as well as usual.

It will be observed in this case, that if the hemiplegia were due to embolism, an artery of the same side of the brain and a branch of the same main trunk were plugged, as when the amaurosis was produced. *A priori* one would expect blindness of one eye to occur on the side opposite to the hemiplegia, but in one of the three cases it was on the same side as the hemiplegia.

But although there was valvular disease, we must remember that he was from his age, rigid arteries, &c., a likely subject for paralysis from apoplexy or softening.

I have seen, however, a case in which defect of sight in the one eye—the right—came on at the same time as hemiplegia on the left, which shows more clearly the connection of the two symptoms (amaurosis on one side and hemiplegia on the other) by embolism. Some time afterwards I examined the eyes by the ophthalmoscope, and, though there was no great difference, yet the arteries of the right optic disc were decidedly smaller than those of the left. This was confirmed by my friend Dr. Bazire, my colleague at the Hospital for Epilepsy and Paralysis, who also examined the eyes. The attack came on when the child was scarcely well of "measles." There was, when she was brought to the hospital, no murmur, but the mother told us that the doctor said there was something wrong with the heart when the child had the "measles." Her speech was good.

Besides the importance of the symptom of blindness of both eyes from disease of *one* hemisphere (in most cases the right), it has, I think, much significance when we remember

that total loss of speech may occur from disease of only *one* hemisphere (the left).

The Ophthalmoscopic Appearances generally found in Amaurosis in Diseases of the Nervous System.

There seems to be an impression on the minds of some physicians, that in amaurosis from intra-cranial disease there should be no abnormal changes in the eyes. Now, I cannot say that such cases do not often occur in the practice of ophthalmic surgeons, but I have met with but one in my practice, *i.e.*, when the defect of sight has been considerable. In the very earliest stage, in Case 5, there were no changes seen by the ophthalmoscope. Indeed, the contrary appears to me to be more true, viz., that often with a slight defect of sight, there are marked changes. Although I describe from cases I have seen myself, I need scarcely remark, that the following appearances are quite familiar to every ophthalmologist. They are fully described by Hulke, and in Carter's Translation of Zander.

What we generally see with the ophthalmoscope in amaurosis in cases of disease of the nervous system, for instance, in amaurosis complicating epileptiform convulsions, hemiplegia, &c., is a white condition of the optic discs—white atrophy. But there are at least two kinds of white atrophy: (1st) One in which the nerve gradually whitens; and (2nd) another in which it becomes white after certain acute changes. The first of these might be called nerve atrophy, and the second cerebral atrophy, but I will speak of them as No. 1 and No. 2 respectively.

In No. 1 the disc is more or less white, round, and well margined, and the central vessels do not always seem to be iminished in size.

In No. 2 the edge of the disc is not well defined. It somtimes gradually merges into the fundus, and is sometimes ragged. The vessels are generally diminished in size, and there is a scattering of pigment in the neighbourhood of the disc.

Both these forms of atrophy are chronic conditions, but the second is, I believe, always a permanent stage of a more acute one. In a good many instances I have noted the following appearances in the early stage of amaurosis, and subsequently the one of atrophy (No. 2). I have seen them also in many other cases, which, from accidental circumstances, I have been unable to trace.

For about three or four times the size of the optic disc is a patch which obscures the position of the disc. It is in parts white, and in parts brick-red, and often spattered with blood. Generally no arteries can be seen on it, but the veins are bulky, and are but irregularly seen, as they seem to struggle their way through the patch to its centre. Sometimes there are little masses of blood the size of pin's heads, more or less, at a little distance from the margin of the patch, but the fundus generally appears to be normal.

[I may here say that I invariably examine the urine for albumen in such cases, and unless its presence is noted in the following cases, it is to be taken for granted that it was not found.]

Although the last-mentioned appearances (acute stage of No. 2) are most often seen in the acute cases of disease of the nervous system, they occur after the full establishment of other symptoms. They are acute as regards the eye, but the blindness they produce must pass as but one symptom of a series in a chronic case.

In what follows no particular order is attempted. It would be easy to make an arrangement of cases under certain arbitrary headings, such as "amaurosis from disease of the hemisphere," "amaurosis with epileptiform convulsions," &c., &c., but this would be of comparatively little value. We know so little of the real causes of amaurosis that a natural order is not yet possible. My object is to give the symptom its place in clinical groups rather than to try to determine the nature and position of the disease of the central nervous system, on which it depends. I trust, how-

ever, that some of the following cases may be of value as regards the latter object.

Difficulties in Studying Amaurosis.

There are, I think, several reasons why we make so little progress in understanding the relations and causes of amaurosis. In the first place it is plain that the loose statement sometimes made that a patient is blind, with no description of the deep changes in the eye—amaurotic in the use of the word before Helmholtz—is not a kind of information of much value in scientific research. It would be of about equal value to a statement that a patient "talked badly." It is of quite as much importance to determine whether a patient's blindness depends on (1) choroiditis, on (2) apoplexy of the retinæ, or on (3) neuritis, as it is to ascertain whether a patient's bad talking depends on (1) incoherence (2) defect of the Faculty of Language, or (3) paralysis of the tongue. And it is obviously as absurd to talk of treating "amaurosis," as it is to talk of treating "loss of the faculty of language." We may give drugs for syphilitic disease of the choroid, or for syphilitic disease of the pia-mater over the left hemisphere, and thus enable our patients to see and talk again.

This confusion from want of opthalmoscopic examinations is one which will gradually get less and less. It is right to say, however, that some eminent physicians, to whose opinions on most matters we should pay great deference, still think, from theoretical considerations, that an ophthalmoscopic examination is likely to be injurious in the early stage of cerebral amaurosis.

But there is another thing which is likely long to remain an obstacle, viz., a want of *post-mortem* examinations on chronic cases which have been well observed during life. In chronic diseases of the nervous system it is almost impossible to help this, except at the expenditure of a vast amount of time and trouble. I may here remark that the imperfections in the observation of some of my cases are obvious

enough, but the time and labour bestowed in looking after the patients, sometimes for years, are not apparent in their recital. The omission of any important details is a matter for great regret, but it is almost excusable, when it is remembered that many of the patients were visited at their homes, and at very great distances, and frequently at long intervals. I wish, however, to insist on the absolute necessity of watching the cases of our patients after they have left the hospital, or gone from one hospital to another. To do this on a large scale requires an amount of trouble which to those who have never tried it, is incredible. Besides it is, in London, very expensive.

Cerebral Amaurosis often Overlooked.

Another reason why the physiology of amaurosis is still obscure is that in acute cases of cerebral diseases, in which we have the patient under our observation from first to last, the amaurosis is often overlooked. This no doubt will seem a strange statement, but it is quite true, and it is easily accounted for. I am convinced that in all cerebral cases we should accept our patients' statements as to their power of sight with great caution, or rather we should interpret them cautiously, since it is the intra-ocular changes that we run most risk of overlooking. For not infrequently in the early stage of cerebral amaurosis, whilst there are to be seen most marked changes in and around the optic disc, with for instance considerable effusion of blood, the patient will complain of but slight dimness, and will read small type. I had under my observation a few months ago a patient who used to read the newspaper every day, and who read small print easily in my presence, and yet had the opthalmoscopic appearances of the acute stage of No. 2 well marked, the effusion of blood around the discs being considerable. This patient subsequently became almost quite blind, his sight eventually failing rather suddenly. He died, and I found at the *post-mortem* examination a tumour at the base of the brain. See "Med. Times and Gazette," June 17, 1865.

Testing the sight by types, as an ophthalmologist would do it in the out-patient room would of course afford valuable evidence as to the existence of intra-ocular disease, but when a patient has severe headache, and general cerebral disturbance, careful testing of his sight is impracticable. It would be by no means easy to say how much of his apparent difficulty in reading small type should be put down to real failure of sight, how much to want of attention. I am quite sure that power to read ordinary type is no certain evidence that there is not fixed and permanent damage to the optic nerve or retina. Besides it is often far easier in a cerebral case to use the ophthalmoscope than to test the sight in the ordinary way. When the patient is lying in bed partly insensible, the ophthalmoscope must be used.

Case II.—*Epileptiform attacks for nine months. Then violent headache, vomiting and Amaurosis, followed by stupor, irregularity of the pulse, &c. Recovery with damaged Optic Nerves.*

The day after I wrote the above, I saw among my out-patients at The London Hospital a case which impressed me very much with the necessity of being careful in our investigation of defects of sight in diseases of the nervous system. A boy eight years old was brought for "fits," of which he had had five or six a-day for nine months. The "fits" were short attacks, in which he became rigid and insensible, but a precise account was not to be got. When I saw him, February 25, he complained much of severe pain in his head—in the temples. This pain he had had two months, but it had been very severe fourteen days only. He had much vomiting, and his mother said he vomited "bile." I mentioned to the students attending my practice that I did not think the boy's sight was affected, for he carried himself as if he could see well, but that as he had vomiting and severe headache, I thought it necessary, in order to be quite certain, to use the ophthalmoscope. I did this as a mere matter of routine. I was wrong in my opinion, for I found that he had the con-

dition of things described as the acute stage of No. 2. The veins beyond the patches were extremely irregular like loose ringlets. The pupils were neither abnormally large nor small. I was obliged to put in atropine to make a satisfactory examination, and in order that some of the students who had not used the ophthalmoscope much, might see at all. I then asked the boy's mother how long his sight had been affected. Now, although he seemed to me during his stay in the out-patient room, to conduct himself as if his sight were good, I was rather surprised when his mother, who had had him under continuous observation, remarked, "I never knew there was anything the matter with it." He had been rather dull, she said, but was quite intelligent, and (what is noteworthy) his temper had not got worse.

The next hospital day, March 2, he did not attend, and I therefore sought him out at home. He had become worse, and his mother had called in Dr. Swyer. To this gentleman I am indebted for permission to watch the case, and for much valuable information about it. The boy was then in bed, and in a condition of semi-stupor. He could be roused to a state of fretful resistance, but not to real sensibility. His mother said that he complained much of his head. I was still surprised to hear her say that she had not found that his sight was bad until the third day after the visit to the hospital. She observed on that day, for the first time, that he could not direct his hands to take hold of things. His pupils were dilated (perhaps somewhat from the strong solution of atropine, used at the hospital seven days before). The belly was retracted. He took literally no food for many days. He gradually improved, and at the end of a fortnight, March 16, I again saw him. Then for the first time I have a note of his pulse. It was very irregular. He was now better in every respect, and his appetite had returned.

A week later (now, therefore about a month from the time when I first saw him), he was still further improved, and his sight especially was very much better. So much better was it that his mother considered he could see well again. I had

no opportunity of testing it, but I was told that from his bed he could count planks of wood in an adjoining yard. The general obscurity round about the optic disc was now gone. There was no blood, and the disc had a general boundary, although no defined edge. On the disc I could see no arteries, and the veins were still large, but not so irregular; their contour was not so clear as normal.

On April 3, I found he had gone out. He had asked to go out to *see* the fire engine. His friends felt sure that his sight was good, and indeed he conducted himself as if he could see well. They were much surprised and distressed when I showed them that the boy could only see with the left eye. I could still see no arteries on the right disc, and those on the left were very small.

May 6. The disc is gradually becoming more defined, and the vessels are to be more clearly seen, but the pain and vomiting returned a few days ago.

Sudden Failures of Sight in Cerebral Disease.

In cases like those just mentioned, the sight sometimes fails suddenly, the ophthalmoscopic appearances remaining nearly the same, *i.e.*, so far as I have been able to estimate them. Now it is most important to keep this in mind, or we might otherwise get a wrong date for the appearance of amaurosis as a symptom. It is well to observe, also, that with the above-mentioned ophthalmoscopic signs of fixed damage to the eye, the sight fails occasionally. The patient makes some such remark as this, "I come over blind now and then." It is difficult to account for such variations, but the difficulty is no greater here than in many other organic diseases of the nervous system, which so frequently show an element of periodicity more or less rough in their symptoms. Thus neuralgic pain from fixed organic disease, say of the Casserian ganglion, comes on in paroxysms. To magnify the fact of periodicity in this kind of amaurosis, by saying that periodicity is an element in all diseases of the nervous

system, does not, of course, make the cause of the phenomena more evident, but it has the advantage of enlarging our field for studying an important law. At one time I thought these variations of importance as regards the question of reflex amaurosis. I supposed they indicated that the "contraction of the vessels" was intermittent. The most marked case of intermittent vision I have seen was in a patient who had incomplete amaurosis, with a disc of the first kind. (See paper on "Coloured Vision," vol. iii., p. 286.) In the acute stage of No. 2, it seems to be more often due to mechanical causes, as stooping, than to quasi-physiological ones like contraction or relaxation of the vessels.

To be quite certain, we ought in every case of disease of the nervous* system, when our patient complains of but the slightest defect of sight, to examine the eyes with the ophthalmoscope, and even when the defect is said to be but an occasional failure, we ought not to omit to do this, as such failures do not always indicate loss of power of accommodation merely, nor what I have spoken of as Epilepsy of the Retina.

I have known a physician to be in doubt whether a child was blind or not. It was certainly difficult to tell by ordinary tests, as the child was lying in bed, was paralysed, and was very fretful. Had the ophthalmoscope been used, there need have been no doubt as to whether there were intra-ocular changes or not. I am convinced that patients frequently die blind without any knowledge of it on the part of their friends. Indeed, the record of an acute case of cerebral disease must be considered to be imperfect if the eyes have not been examined with the ophthalmoscope. In the boy's

* In the out-patient's room at the Hospital for Epilepsy and Paralysis and at the London Hospital there is a gas-lamp for these examinations. (This lamp serves also for the laryngoscope.) When everything is thus ready, it takes very little time to make an ophthalmoscopic examination. It is quite a different thing when one has to make an examination at the home of one of our hospital patients, especially when he is very ill, awkwardly placed in bed in a confined room, and where the only light to be had is that of a candle, held by the patient's pillow.

case, just alluded to (Case 2), I should have overlooked this very important symptom if I had not been in the habit of using the instrument, as a matter of routine, in cerebral cases. I repeat, that if I hear, or read, of a case of tumour of the brain in which the patient had gradually become stupid and inattentive, and, perhaps towards the end, comatose, I attach little value to the negative statement that the patient's sight had been unaffected, unless the ophthalmoscope had been used.

This, in one sense, may be of little importance if the disease be fatal—the loss of sight merging in the greater evil of loss of life—but it makes a vast difference in our attempts to build a system of medical physiology, whether in using (say a case of disease of a particular part of one hemisphere) we have omitted from it a symptom so important as amaurosis. If the patient continues conscious, he will of course find that he can't see; but if his sight fades gradually, and if he at the same time passes into a state of stupor, he will not manifest that he has lost sight when he has lost power to perceive. In children this is more likely to occur than in adults, and here it is absolutely necessary to use the ophthalmoscope. I have recently made a *post-mortem* examination on the body of a boy nine years of age, who died of tubercular meningitis, under my care. I only saw him once, but he was visited at home for me by my friend Mr. Ceely. I have here to blame myself for not having made an ophthalmoscopic examination. I have little doubt, although there was no obvious evidence of it in loss of sight, that this patient's optic nerves were diseased (See further on question of time). He was, when I saw him, at The London Hospital, a week before his death, too ill to complain of a slight defect of sight, and he soon passed into a state of stupor, which rendered it impossible to ascertain anything from his friends about it, if he had become actually blind. Now I do not think that I should have found the acute changes (of No. 2) in the optic nerves, because the boy had tubercular meningitis; (for I have, in several cases of tubercular meningitis, not

found these appearances); but because, at the autopsy, there was seen considerable disease of the outer part of the right hemisphere, just above the level of the lateral ventricle. Here was a mass—the only mass in the brain—of tubercle, the size of a small walnut. My reason for thinking there would have been the ophthalmoscopic appearances I have mentioned, is simply this, that I have found them in cases of disease of that part of the hemisphere. It would, I think, be very unfair to scientific inquiry to say, "There was no evidence of amaurosis in this case of disease of the right hemisphere." Of course there was no evidence, but it was not looked for in the only way, I confidently assert, in which it could have been discovered. We found a good deal of lymph at the base of the brain, and it may be supposed that this would have been enough to have given rise to the acute changes (No 2). It certainly should be taken into consideration, and we know that effusion of lymph in this neighbourhood does paralyse the small nerves of the muscles of the eye; but in the few cases of tubercular meningitis I have examined with the ophthalmoscope (for the opportunity of doing which I have to thank my friend Dr. Gee, late Medical Registrar of, now Assistant Physician to, the Children's Hospital), I have not seen those appearances, although the children were younger and there was more lymph effused.* I may just add that the boy's liver and spleen contained tubercle. Although on the only occasions when it was examined (two days before death) the urine contained albumen, yet the kidneys did not seem, except for a very few specks of tubercle, to be abnormal, but they were not examined by the microscope.

It is, I submit, imperative in all cases of severe cerebral disease, at all events in cases of an acute kind, to examine

* In a case of tubercular meningitis in a young man recently in The London Hospital (under the care of my colleague, Dr. Parker), Dr. Woodman and Mr. Adams (junior) made an ophthalmoscopic examination. They found merely a little difference in the calibre of the vessels. In this case, however, we did not at the autopsy find much lymph at the base.

the eyes with the ophthalmoscope whether the patient complains of defect of sight or not.

I do not say that it is important as a guide to treatment, but it is absolutely necessary if cases are to be used as materials for scientific purposes. In short, in many cases we are bound to record, not only what the patient tells us, but what we see with the ophthalmoscope. A few months ago, I had under my care a patient whose case impressed me greatly with the necessity of doing this. A man 39 years of age, was attending at the Hospital for Epilepsy and Paralysis, for occasional attacks of epileptiform convulsions, affecting the left side. He had been subject to them for several years. In cases of unilateral convulsions, I make it a rule to examine the eyes with the ophthalmoscope. I did so in this case, June 21, entirely as a matter of routine, as the patient did not then complain of defect of sight. The note was, *"The optic discs are certainly redder than normal." On August 31, more than two months later, he complained of a little dimness, and I now found that the discs were quite lost in a general redness, being, except for the large converging vessels, not easily distinguishable from the rest of the fundus. The arteries were small and the veins large. To my surprise the patient could read words in Brilliant type *i.e.*, No. 1, of Jaeger, and had been able to attend to his duties as an artist. It may be said then, that *as a matter of fact* this patient's sight was good, but then *as a matter of*

* This patient had, and still has, albuminous urine. It may be said, then, that the retinal changes were due to the renal disease, and not to disease of the hemisphere, at which I hint in the text. If they were, the case still illustrates the principle I have mentioned. I shall again refer to it, and try to show that the intra-ocular changes did depend on disease of the brain. In Dr. Habershon's case (see further) there was albuminuria, and yet the amaurosis was evidently caused by cerebral tumour. At all events my patient had the exact kind of epileptiform seizures which are often complicated with retinal changes, and which seizures do *not* depend on uræmia. At the last examination, about nine months after the one recorded in the text, the colouration of the disc and fundus was normal, but the veins were remarkably irregular. His sight was good; he said he was going to Cornwall to make designs for a building. His chief trouble was swelling of the legs.

fact there were marked changes in the circulation of his eyes. To have recorded one of these facts would have led us to wrong inferences. Although he could see to do his work, he nevertheless had a symptom of the highest importance in chronic *unilateral* epileptiform seizures. For it must be carefully kept in mind that with the physician it is not only a question as to whether the patient can see well with his eyes, but whether they present signs to throw light, with the other symptoms, on the position or nature of the disease of the central nervous system. Just in the same way the slight numbness of the face, arm, and leg, another symptom this patient had, pointed as unmistakeably to disease of the opposite side of the brain, as total paralysis would have done. The amount of nerve tissue damaged would have been very different, but the general position of that damage would have been the same. In a word, we must think of amaurosis, hemiplegia, &c., not only as important *diseases* incapacitating the patient, but as *symptoms*, significant in a physiological series.

We are sometimes reminded of the sudden failures of sight in a rather disagreeable way. The man whose case I alluded to, attributed, if I might judge from his manner, the failure of his sight to my ophthalmoscopic examination. Another patient (hemiplegic on the left), whose case I shall afterwards relate, and whom I now, for the sake of identification, call the Swede, attributed his loss of sight to a blister which had been prescribed in another hospital. The blister was put on at night, and the next morning he found that he could not see. Another (hemiplegic on the right) attributed his loss of sight to galvanism; * he

* I have since learned that "the direct continuous current was used for six months, and then the inverse current by placing the wet conductor attached to the positive pole upon the bellies of the contracted muscles, the wet conductor of the negative pole over the left temple." Perhaps many will say that the patient was right in this case, but we must remember that he had the kind of amaurosis which not unfrequently complicates hemiplegia, and which is undoubtedly due to organic disease. Dr. Althaus in his valuable work on Medical Electricity dwells on the necessity of avoiding the

had been galvanized for the hemiplegia. In all these there had been the acute stage of No. 2.

I saw, about a year ago, a patient under the care of Dr. Wilks, in Guy's Hospital (I have to thank Dr. Wilks for permission to make use of the case), whose case impressed me strongly with the risk we run—on the one hand—of being thought not to have paid attention if we omit to examine the eyes in acute cerebral disease, when the patient, on recovery, finds he can't see; and on the other hand—the risk that the blindness might be supposed to be due to our ophthalmoscopic examination.

The *post hoc ergo propter hoc* argument is a very common way of reasoning in all classes, and if a patient's sight has failed after a blister, galvanism, the use of the ophthalmoscope, or after any other particular plan of treatment or examination, he may think it failed in consequence of such treatment or examination. He will say, with confident assurance, "It was never so before." It is well then, if we find the acute stage of No. 2, and the patient's sight remains pretty good, or not very bad, to tell him or his friends that it may get much worse, and that it may fail suddenly. Again, we ought not, in retracing the history of a cerebral case for scientific purposes, to think that because our patient has told us that his sight failed somewhat suddenly in a day or so, that there were no intra-ocular changes before that date. If I may use such an apparently contradictory assertion, I should say that the "symptom amaurosis" often appears before the "disease blindness" does. We may find signs in the eye of great value before the patient complains much of his sight.

Case 3.—*Vomiting—Headache—Slight defect of sight, with marked ophthalmoscopic changes—Paralysis of both external recti.*

To return to Dr. Wilks' patient's case. The patient, a

application of the continuous current in paralysis of the face for fear of endangering sight. He quotes a case from Duchenne, in which sight of one eye was lost after a single application. I, unfortunately, do not know how long it was after the galvanism that my patient's sight failed.

girl aged 14, about three months before I saw her, came home from her work to dinner one day, complaining of sickness. She, however, ate her dinner, but vomited it again. She afterwards suffered severe pains in her head and continued to vomit very frequently. When I saw her she had paralysis of both external recti, but no other local paralysis, although she was generally weak. She seemed to see pretty well, and I was, therefore, astonished to find the ophthalmoscopic signs of the acute stage of No. 2. I repeated this examination, and the date of this second examination was December 19. She still considered that she saw pretty well, and seemed to do so, but I regret that I did not test her sight carefully.* On December 22, I again saw her, and now she had an amaurotic look, and said that she was blind; yet, to my surprise, I could detect no difference in the ophthalmoscopic appearances. Shortly afterwards she went home, and I saw her no more. She died in March, under the care of my friend Dr. Poole, of St. Mary's Cray, but he was unable to procure an autopsy.

The Chief Disease, in a Cerebral Case in which Amaurosis (No. 2) is a Symptom, rarely involves the Optic Nervous System.

Although we often meet with these acute changes (of No. 2) in patients who have previously had for some time other symptoms of disease of the nervous system, they are more frequently found in cases admitted into hospitals for general head symptoms of a more or less acute kind, running

* The ophthalmologist will wonder to see this apology again so soon, but he must bear in mind, that to me the changes in the eye in such cases are of most importance as completing a series of symptoms of disease of the nervous system. It is their particular significance and not their individual importance that claims most of my attention. I hope this may pass as a fair excuse, if not as a good reason.

The changes in the optic nerves are always, *i.e.*, in cases I have had, secondary to some local disease in the head. It is the central disease we have to discover, although, perhaps, in treatment we may still do something for the secondary changes induced by it.

a very variable course as regards time. I purposely use the phrase "general head symptoms" for the well-known series which so often accompany and precede the development of the kind of amaurosis of which I am now speaking. Although they appear to be sufficiently definite and constant for clinical grouping, especially blindness, vomiting, and intense pain in the head, I have found very various pathological changes *post-mortem*, and, moreover, the changes have been in widely different positions. From these three symptoms we can only tell that our patient has intra-cranial disease, but they are not definite evidence as to what that disease is, nor as to where it is. What the disease may be we learn from the general symptoms (*i.e.*, such as indicate syphilis, cancer, tubercle, &c.). We try to diagnose its exact whereabouts by the aid of such accessory symptoms as hemiplegia, paralysis of cranial nerves, &c. It is a very great mistake to suppose that this form of amaurosis necessarily indicates disease primarily involving the Optic Nervous System. [I use this expression simply for brevity, meaning parts from the corpora quadrigemina to the retinæ.] The optic nervous system must, it is true, be secondarily affected, but the chief disease is scarcely ever found near it. I have seen this kind of amaurosis in cases of disease of the anterior lobe, middle lobe, and posterior lobe; tumour of the vermiform process of the cerebellum, and in tumour at the base of the brain. In but few of the cases from disease of the hemisphere was it possible that there could have been pressure on any part of the optic nervous system. I used at one time to reason in some such way as the following, in trying to fix the seat of disease in a cerebral case with amaurosis—"From the amaurosis it is probable that the disease extends to or presses on the optic nerves," &c., &c., but I now think that from this form of amaurosis alone I could no more diagnose the position of disease within the head than I could from the peculiar vomiting.

Severe Headache—Urgent Vomiting—Amaurosis.

It is by no means easy sometimes to distinguish head affections from gastric disorders; at all events, I know that mistakes of this kind are made. Severe headache and frequent vomiting are well recognized signs of cerebral disease, but they are not characteristic of it, although cerebral headache and cerebral vomiting are, I believe, with care to be distinguished from the headache and vomiting attending gastric disease. Now, it is in cases of this sort that amaurosis (No. 2, acute stage) occurs, and the presence of this symptom would be a valuable means of clearing up doubts; but it is in such cases that it is not found, simply because it is not looked for, and thus very many opportunities of investigating the relation of amaurosis to disease of particular tracts of the nervous system are lost. The amaurosis is of necessity discovered if the patient gets well, but then, as I shall afterwards point out, it is frequently too late to be of great use as a scientific fact, and of course too late for hopeful treatment.

It is not difficult when all acute disease is over, and when the patient is in good enough general health, as the boy whose case I have alluded to (Case 2), to attend at an Ophthalmic Hospital, to say, from the history, that he *has had* cerebral disease, but it is quite a different thing when we see the patient in the early stage, when the local symptoms are kept in the background by severe pains in the head, by vomiting, &c. I may here mention, as bearing not on this particular point, but on the general one of the difficulty of diagnosis of acute cerebral diseases in their early stage, that Dr. Wilks tells me that he never knew a single case of tubercular meningitis in an adult, whether in private or in hospital practice, which was not in the early stage taken for fever. Later, when such a symptom as "squinting" comes on, the diagnosis is much assisted. And just as strabismus is a valuable symptom, although the patient may not complain of double vision, so the ophthalmoscopic signs I have

mentioned are most important, although the patient does not manifest that his sight is bad.

It is, I believe, not at all uncommon to find at Ophthalmic Hospitals patients giving a history like the following. I do not see much of cases in this stage, but this patient was sent to me by Mr. Couper:—

CASE IV.—*Severe headache and vomiting, followed by Amaurosis—Permanent Blindness.*

A boy, 12 years of age, had had good health, so far as I could ascertain by many careful inquiries, to the age of 9½ years. He had then two blows on the head. The second, a week after the first, was immediately followed by a complaint of headache and sickness. For six weeks he "kept nothing on his stomach, and everything he took turned to a green water." He had also severe pain in the head, and was so bad altogether that he was kept in bed, and his head was shaved. He had no "fits" of any kind, and was not delirious. In about seven weeks he was free from these symptoms, and then, but not till then, his mother noticed that he could not see well. He used to tread on the baby in the day time, and in a week after she first noticed that it was defective, sight was altogether lost.

When I saw the boy he was quite blind, and the optic nerves were "white and atrophied." (No further description in my case-book.) His head was large, and the veins of the face and forehead were large and prominent, but there was no exophthalmos, and his mother said his head was no bigger than it always had been. If she were correct, the only symptom he had when I saw him of the long-past intra-cranial disease was amaurosis.

In a case like the above the existence of cerebral disease might easily have been overlooked for the first week or two, and if, instead of getting better, the boy had died, it is more than probable that the amaurosis would not have been recognized if the ophthalmoscope had not been used. In such a case a careful localization of the disease at a *post-mortem*,

would have led to error if it had been supposed that it had not produced blindness.

The pain in the head and the vomiting must receive quite as much attention as the third symptom amaurosis. The vomiting attending cerebral disease is a special, although not a peculiar symptom. It has a well-recognised position in the symptomatology of head affections of children, but, although well recognised, it is not so much kept in mind in diagnosis in adults. Dr. Habershon, in his work on Abdominal Diseases, gives a most interesting account of the relative value of this symptom in the diagnosis of gastric, cerebral, and other diseases. He writes: "The importance cannot be over-estimated of distinguishing between vomiting of cerebral, spinal, or nervine origin, and that which arises from gastric or other abdominal diseases." In another part of his work he writes: "Disease of the brain, then, is another cause of vomiting, and one which it is important to bear in mind in the diagnosis of disease; too often the so-called bilious attacks of children are the first indications of acute hydrocephalus * * *. The diagnosis of these cases is sometimes exceedingly difficult, when commencing with symptoms of true gastro-enteric disease."

I need scarcely remark that the vomiting must be thought of as a general symptom of brain disease, although I necessarily treat of it in this paper as a symptom accompanying amaurosis. For, of course, we get, both vomiting and headache in severe cerebral disease without any amaurosis. On December 28, 1863, I saw, with Mr. Marsh, of St. John Street, a woman, 35 years of age, who was then dying of cerebral disease. Twelve months before, after a confinement, she began to be ill with pains at the back of her head, and her temper became bad. Still she kept at her household work until a month before death. About that time she had a "fit," in which, we were told, the left side only was convulsed, and she had some weakness of that side. She had a second fit, but still kept about. She had severe pain in the head and frequent vomiting, and it was carefully ascertained that the

vomiting was quite "purposeless." On December 26 she had a succession of fits and lapsed into insensibility, and died on the 28th. Now this is just the sort of case in which we frequently find amaurosis, and it is a case in which I should have expected that there had been marked changes in the optic nerve, even if the patient had complained little or nothing of her sight. The use of the ophthalmoscope here I consider, gave most valuable negative evidence. The discs were perfectly healthy. There was no autopsy. In this case there was, most probably, disease of the surface of the right hemisphere. We know that disease of this part of the brain sometimes is and sometimes is not attended by amaurosis. I hope to show that it requires a certain amount of time for disease in this position to give rise to amaurosis, and I think it most likely that in the above-related case amaurosis would have come on if the patient had lived longer. The comparatively short duration of the disease may account for the absence of neuritis in tubercular meningitis.

Were we to meet with loss of smell, with vomiting and headache, the combination would be just as significant, although the special sense lost would be comparatively unimportant. Urgent vomiting and severe headache, complicated with anosmia, would lead to a grave diagnosis just as when complicated with amaurosis. I have, however, not yet met with the former combination. It no doubt occurs, but I have not been consulted for it. Anosmia, in my experience, occurs most frequently with a certain kind of epilepsy. Not infrequently, anosmia forms a fourth symptom with amaurosis, headache, and vomiting.

It is certainly very remarkable how frequently vomiting is associated with amaurosis, and how rarely with certain other symptoms of cerebral disease. Statements of mere facts on this matter would show what would appear at first glance to be arbitrary relations. One would *a priori* expect vomiting to occur with loss of speech, as well as with loss of sight, but in my experience it very rarely does. This difference in

two such equally well-marked symptoms must be studied along with other differences they present in their clinical history. Loss of speech is nearly invariably associated with hemiplegia amaurosis much more rarely. Loss of speech is generally due to embolism, amaurosis generally to tumours or to disease more evidently organic than mere limited softening. Loss of speech (the Aphemia of Broca and the Aphasia of Trousseau) occurs from disease of a limited part of one hemisphere (the left only?), amaurosis from disease in almost any part of the brain. As I shall afterwards try to point out, the study of amaurosis and loss of speech, for negative and positive facts, may be most conveniently carried on together. For in spite of work done to show that speech resides in a certain part of the (left) hemisphere, it is very frequently said, both of loss of speech and amaurosis, that they may be caused by disease of almost any part of the central nervous system. Indeed, it almost seems as if it were rather the nature of the disease than its position which produces amaurosis, headache, and vomiting. For instance, abscess of the cerebellum (at least, so far as I know) is not associated with amaurosis, but tumour of this part nearly always is. This may be because some kinds of disease, as tumour, produce general disturbance in the head, whilst limited softening of the brain, the frequent consequence of plugging of the middle cerebral artery (which on the left side supplies the corpus striatum and many convolutions) is not likely to disturb the rest of the cerebrum. It will be observed that the vomiting, headache, and intra-ocular changes generally cease together, and thus, although the patient may remain blind from the damage, during the acute stage, to his optic nerves, he loses his pain and ceases to vomit. And we must keep in mind that it appears, as I have just remarked, to require time in order that amaurosis may be developed from disease of the cerebellum or cerebral hemispheres, parts which are not directly connected with the optic nervous system.

Just as we carefully observe the amaurosis in cerebral

disease, so we ought to study the peculiarities of the vomiting.

The vomiting attending cerebral disease is what I would call "purposeless;" although it is aggravated by eating, it frequently comes on without any apparent cause, or from a very slight one. A little movement will bring it on. It continues after the stomach is emptied, or begins when it is empty. The patients, or their friends, say that very often nothing but a little froth, or "phlegm," or bile is brought up. The patient has much straining, and this causes great distress; and probably the "bilious vomiting" of these patients is due to the straining causing bile to pass from the duodenum into the stomach. It is not a very infrequent thing to be told that a patient's sight failed after "gastric" or "bilious" fever. We ought also to be equally careful to note the cases in which there is no vomiting. Such negative evidence is of great value in unravelling the physiology of diseases of the nervous system.

In many of these cases it is very easy to tell that our patient's pain is no ordinary headache, and, indeed, he frequently makes a remark to that effect. The proper place to describe this symptom is in narrating cases. The pain is frequently at the back of the head, sometimes from temple to temple, sometimes at the vertex, sometimes "over the eyes." Headache from intra-cranial disease is always general, *i.e.*, it is diffused, and never follows the course of a nerve trunk. It never affects the face. Of course I except cases in which a tumour happens to grow in or near to the fifth nerve or some of its branches. Sometimes, however, the pain may be chiefly or altogether limited to one side of the head, but in these cases it is still diffused, and is generally due, I think, to disease of the bone or of the dura-mater.

Case V.—*Severe pain in the head with vomiting, and slight dimness of sight—Subsequently Amaurosis and Hemiplegia on the left side—Death—Autopsy—Extensive organic disease of the Brain.*

Occasionally pain in the head is for some time nearly

the sole warning symptom of coming severe cerebral disease. When I was clinical assistant to Mr. Poland, November, 1861, I saw a young woman, whose case, I submit, shows the great necessity of thinking of the possibility of serious danger in cases of pain in the head when attended by the slightest defect of sight. The patient, a girl 19 years of age, had had severe pain "across the forehead," for three weeks only. She described it as being "terrible." She had not been subject to headaches before. Her sight had failed one week only, but when examined at the Hospital, she appeared to be well, and could read "brilliant type" easily. She remarked that "things looked rather dim." On using the ophthalmoscope, no changes were to be seen. I say this confidently, as the eyes were examined by several gentlemen carefully. Indeed the patient looked so well that it was supposed by some that she was hysterical, and that the defect of sight was pretended. A week later, however, we found that her sight was much worse, she could then only just see the bars of the windows. And now "the optic discs were swollen at their edges, the veins were large, the arteries rather small, and were not seen passing over the swollen disc." This was the note made by Dr. Bader on the patient's ticket. She soon ceased to attend, but a year later I saw her in Guy's Hospital under the care of Dr. Wilks. She was then hemiplegic on the *left* side (it was the common form of hemiplegia), the arm being completely paralysed. She said her sight was much better. Beyond the statement that there was "atrophy of the optic nerves," I know nothing as to the ophthalmoscopic appearances in this stage. She afterwards died in another hospital, and an autopsy was made. I regret to say that I have been unable to obtain any particulars as to her condition in this hospital, nor even as to what has been recorded of the *post-mortem* appearances, beyond the statement that there was induration of each hemisphere and of the spinal cord.

Moreover, the above note shows that, early in a case, there may be no marked ophthalmoscopic signs to give

enough definiteness to "dimness of sight" attending severe headache to enable us to recognise in it a special symptom of cerebral disease. Now I by no means wish to imply that "dimness of sight, with a headache is a serious thing," but that it is always imperative to view this series of symptoms most carefully, and especially if the pain be severe, or unusual, and, above all, if attended by urgent, purposeless vomiting. Without coming to any positive conclusion, either to alarm our patients or to fetter our own therapeutical proceedings, we certainly ought to keep our minds open to the fact that such symptoms do sometimes herald severe and often fatal cerebral disease.

Severe headaches are, I think, too frequently, especially if the patient be subject to them, put down to gastric or abdominal disease. Now I think it is at least, just as likely that severe pain in the head is due to disease within the head, as that pain in any other part is due to disease of that part. And although the instances may be rare, I repeat that we do know that "bilious" headaches sometimes herald severe brain disease. Certainly, pain in an unusual position, as at the vertex or in the temples, should receive most careful attention and wide consideration.

Sometimes the patient has been subject to attacks of pain in his head, with or without vomiting, for years before amaurosis or other more local cerebral symptoms set in. He may tell us that he has been subject to "bilious headaches." In one case of amaurosis, with intense pain in the head, I found at the autopsy a mass of tubercle in one lobe of the cerebellum. This patient, a middle-aged man, had been subject to violent headaches, almost from infancy. When I recorded his case I could not use the ophthalmoscope, so that I cannot be certain as to the nature of the amaurosis.

A few months ago Dr. Habershon showed me a woman, 25 years of age, who had amaurosis and anosmia, with weakness of the left arm and leg. The optic discs presented the appearances of No. 2, and she could see nothing. Now this patient had been subject to severe headaches, with

vomiting of "bile," from the age of 12 years, but the anosmia, the amaurosis, and the paralysis began only two years before death. During these two years the headache and vomiting had been very severe. After death a tumour was found at the base of the brain. There was also renal disease. (See Dr. Habershon's report of the case, "Medical Times and Gazette," Oct. 29, 1864.)

This was a chronic case. A few years ago I saw a patient whose case impressed me very much with the necessity of being cautious as to the inferences we should draw from the two symptoms, severe pain in the head and bilious vomiting, even when the patient has been long subject to attacks of these symptoms. To take the most obvious and superficial inferences would show carelessness, and yet, as we most frequently see vomiting and headache as symptoms of abdominal disease, we may not keep our minds alert to the possible existence of other causes. It is one thing to know the value of certain symptoms and another thing to keep it in mind at the right time. After all our care we may still be in painful doubt.

Case VI.—*Severe headache and vomiting, with dimness of sight and numbness of the left arm and leg in a patient who had been subject to "bilious headache."—Death.*

The case was that of a young lady about 24 years of age. She had severe pain in the head (on one side), distressing vomiting, and intolerance of light, but her sight was apparently good. I was then on a visit to the country and had no ophthalmoscope with me, so that I have no actual knowledge as to the condition of the eyes. Nor did I then think there was anything serious the matter with the retinæ or optic nerves. I thought it nothing remarkable that with severe headache there should be some intolerance of light. Now, after further experience, I feel almost certain that she then had neuritis of the optic nerves. The patient was menstruating, and as she had generally had dis-

tressing headache and bilious vomiting at former menstrual periods, her parents were only anxious on account of the severe pain and distress she was suffering. Nor from these symptoms did I then think seriously of the case, but there was another which saved me from giving a too favourable opinion. The patient had numbness on one side—of the left arm and leg. It was not because she had numbness, but because the numbness persisted on *one* side that I diagnosed organic disease within the head. A symptom so local being limited to one side of the body and yet so wide as to affect both the arm and leg shows, I think, in spite of its slightness of degree, central and local disease. But this symptom is by no means always present to aid in diagnosis, and in children could not be made out. In such cases the ophthalmoscope would be of the greatest service. I only saw the young lady once, but I know that several weeks later she died in convulsions, and that she became blind (of one (?) eye).

The intolerance of light in the above case was marked, and *great* intolerance is not a common symptom in the class of cases I am speaking of, and it must not be supposed that it necessarily indicates retinal disease, or at least visible retinal disease. A few days ago I saw, with Dr. Daldy and with Mr. Greenwood, of Dalston, a boy about ten years of age who had suffered for eighteen months with intense pain in the head. When I went into the room I found an elaborate arrangement, so that the light in the room might be kept off the corner where the patient's bed was, and I was told that in the day-time they were obliged to keep the windows covered up. The pain was constant, but worse in paroxysms. He had never had any marked vomiting, and his parents said his sight was good. As the father was anxious to have the head examined if the boy died, and he was very weak and much emaciated, we insisted on making an ophthalmoscopic examination. For, as I have said, I attach very little importance to what it is possible to gather from a fretful, miserable patient in a nearly dark room, as to power

of sight. After a little trouble I saw the optic disc of one eye, the left. The information thus obtained was negative, as the disc was, to my very great surprise, normal.

I keep in mind, however, that the element of time is to be taken into account in drawing conclusions from cases of this kind. In this case amaurosis may yet supervene. It is very remarkable also that with such long-continued and severe pain in the head vomiting has never been a marked symptom.

I will now give particulars of a case of which I took note when the patient was under the care of Dr. Brown-Séquard, my (late) colleague at the Hospital for Epilepsy and Paralysis. It shows how insidiously blindness may creep in amongst other more prominent symptoms. As I have already reported this case in the "Medical Times and Gazette,"* May 28, 1863, I merely give a few lines here.

CASE VII.—*Severe headache and vomiting—"Gastric Fever"—Strabismus—Amaurosis—Subsequently Epileptiform attacks.*

A woman, 19 years of age, had been in excellent health up to the age of 18, when (August, 1861) she began to suffer from severe headache and vomiting. She then had strabismus, but this passed off in a month, the pain in the head and sickness continuing. She then went into a hospital, where she was told† she had "gastric fever." She

* None of the cases in this paper have been previously published, except those to which a reference is appended.

† Nothing ought to be received with greater caution than our patients' reports of what other medical men have told them. In this case, if the diagnosis of gastric fever had been made, it had not been persisted in, as leeches were applied to the patient's head. A woman once told me that her doctor had given a certificate that her husband had died of rupture of the gall bladder. This was obviously nonsense, but it is worth mentioning as showing how carefully medical men ought to speak to avoid misinterpretation and misrepresentation. I may just mention that this patient had had severe bilious vomiting and violent headache. At the autopsy I found remains of effusions of blood in various positions, and recent effusions in the roof of the *iter a tertio ad quartum ventriculum*. There was no evidence of amaurosis in the case, and again, most probably because it was not looked for. I had no chance of making an ophthalmoscopic examination.

was in the hospital several months, the vomiting continuing. When she went out she was quite blind.

She was afterwards under the care of Dr. Brown-Séquard for epileptiform seizures and for weakness, more especially on the left side. Under his treatment she got rid of these two symptoms, but remained blind, and is so still. The optic discs are white, flat, and irregular at their edges, and the vessels are very small. Had this patient, instead of recovering, died after a few weeks' stupor, her blindness would have easily escaped notice.

The following case is interesting, as showing several things in the clinical history of amaurosis.

Case VIII.—*Epileptiform attacks—Loss of smell, sight, taste, and hearing—Continued vomiting and severe headache.*

The patient, Mary P., aged 23, came under my notice, February 25, 1860, when I was clinical assistant to Mr. Poland at the Royal London Ophthalmic Hospital. She had then been admitted six months. Up to the age of six years she had good health. She then fell on her head, alighting on the back. She was a little stunned, but recovered, and was apparently well until next day, when, exactly twenty-four hours from the accident, she was seized with "a fit." She was convulsed, bit her tongue, and was black in the face. Her mother does not remember whether one side of the body was affected more than another. She remained in this state for five or six hours. She then recovered, and the next day could walk, never dragging the leg. She was in one week quite well again, except from pain in the head and sickness. Six months after this she had a second fit. She complained of pain in her head at school, was sent home, and put to bed. Her mother shortly after found her in a fit similar, as far as she could make out, to the first. She limped with the *left* leg and foot for some time after this, and even now [*i.e.*, 1860] she is "weak" on the left, and fancies that the arm and leg on this side are not so large as on the other.

It is from this the second attack that the defect in the eye is dated. It began first merely as a prominent state of the ball of the right eye, and, as far as I can make out, was not at first attended with any loss of sight. Her sight only began to fail at the age of 18 or 19. At this time too (viz., at the age of 6 or 7) the lids were unaffected.

She has had no fits since the second one, but ten years ago, at the age of 13, when she had the measles, she had what she calls "catchings of the head," the head being turned round suddenly and momentarily for two or three times. She thinks the head was turned to the *left*. She has not noticed it since the measles.

She is now subject to what she calls "cramps" on the *left* arm and leg; this, however, appears to be more a loss of power of the flexor muscles. It is, she says, always present in the cold, and is a continuous affection, being merely that the hand and fingers are straightened, and bent back, not painfully so, and at the same time not spasmodically, as she can use the hand and leg, though only for rough work. *E.g.*, she can lift a pail, but cannot button her dress with the hand. She says that in the foot the toes are drawn in.

Menstruation commenced about the age of 18, and has continued since. She is subject to a pain in the back of her head, which is like a hammer rapping. The head seems to roll as if full of blood. She is pale, pasty; looking sleepy, weary, and confused, but is intelligent. She sleeps well, and often sleeps in the day time. She says that she has had every morning on rising for the last week a pain in the head. It goes off in about twenty minutes; it is in the forehead and temples of both sides, but most in the left temple. There is no loss of sensation in the parts. There is no pain localised in the region of the infra-maxillary, subcutaneous malar, or superior maxillary nerve. The hearing is quite good, and she has no noise in the ears.

The lids of the right eye are swollen, and on the outer side, below the level of the commissure, is some very slight varicosity and œdema. The left eye is unaffected in its posi-

tion, but the pupil is much dilated, and the sight of this (the *left*) is quite gone, or at least she could only see the ophthalmoscope lamp at a distance of a few inches (*heat ?*). The left eye began to fail eighteen months ago. She says that things seemed foggy, and as if dancing about "dazzling." The pupil contracts by light. With the *right* eye she cannot count fingers, though she can distinguish them.

[Except that the optic discs were quite white, I have no note as to the ophthalmoscopic signs. And here I may confess that at the time I recorded this case I did not distinguish the various kinds of white atrophy, as I have tried to do in this paper.]

The patient lost smell about the same time that she lost her sight. It was totally lost; there is circumstantial evidence of this, but I have no details of any scientific tests of it.

Dec. 6. She looks much better. There is now very much less prominence, and there are no distinct veins. Around the right eye, which is the prominent one, the feeling is a sort of watery one. It is impossible to *get hold* of the swelling. She complains of a spasm ("neck stiff") on the *right* side, turning the head to the *left*. She says it is momentary.

March 2, 1861. She has a pain in the back of her neck and temple, as if "it was drawn up by a needle and thread." The pain comes on very suddenly—quite momentary—and lasts for an hour or so. It ceases very suddenly. The pain seldom affects the eyes. I now learn that her hearing is better on the left side. It is worse sometimes.

May 10, 1861. I was to-day asked by her mother to see her at home. She had been worse again for above a fortnight. She looked pale, and there was rather more prominence of the right eyeball. There was no marked varicosity, and no swelling beyond the eyelids. The eyelids were soft and elastic. There was no trace or semblance of pulsation. She had been worse from pain in the head—at the back and at the posterior half of the vertex. It did not come forward to the eyes or face. She said she had pain in the eyes, but not

in front, but "in the part which is far back in the head." This pain was very severe, and came on about twice a-day. It was at the *same time* attended by pains in the calves of the legs and in the back of the thighs. This latter was very severe, and she thought, but was not sure, that it was cramp. She always knew when it would come on by first feeling pain in her head. She relieved the pain in the head by throwing it back. She said that her legs felt numb. She said that her legs "bent" when the pain was coming on. Her fingers got stiff, and curled up occasionally. She was still totally blind. She vomited after everything she took. She was much more deaf, and now both sides were equally affected.

May 11. When I saw her, she had an attack of pain in the head. As before stated, it was at the posterior part of vertex, and in back of head, and *not* coming forward to eyes or face, or forehead, or temples. She again, on being asked if she had pain in the eyes, said, "No, but in that part of the eyes far back in her head."

May 15. She has been worse. The pain in the *back* of the head is better, but in the posterior part of vertex very great. The pain in the back of her legs is also severe. Vomiting, however, still persists, and is now the most urgent symptom. She vomits all she takes. As she thought the blisters behind the ear relieved the pain in the back of the head, I ordered two to the temple, and a cooling lotion to the forehead.

May 25. I this evening examined the eyes with the ophthalmoscope. Both optic discs were as white as a piece of paper; the rest of the fundus looking velvety. The vessels over the white discs were small. She did not see the light of the ophthalmoscope.

26. Vomiting is still one of her chief symptoms. For several days she has had "spasmodic" attacks, in which her limbs catch up; no loss of consciousness. She has lost considerable power over her legs, and this is often for a time aggravated, so that she for a time looses her use in them altogether.

September 12. She is now quite deaf, and, being blind

too, it is necessary to communicate with her by means of a raised alphabet for the fingers. She can speak well, and can read easily in her blind book. Considering that she is deaf and blind she walks well. She has now lost taste.

October 18, 1861. She has now pain coming on at the back of the head, which causes her to throw her head back. It does not take her senses away, but it is very severe, and lasts, she says, about a quarter of an hour. The eyes are (her mother said) drawn quite close to the nose (spasm of the internal recti?), but the eyes are staring wide open. The right arm and leg are affected in some way; the leg, probably, was affected at the same time, but this was not observed. After the pain, she vomits, straining a good deal, and after this she has the hiccup. The pain begins suddenly, and goes away suddenly. As a proof how well she can walk, I record the fact that she has just come down a narrow, winding staircase without assistance. Her speech and voice are all right, her mind is clear. For five months she has not menstruated.

I did not see her again for about a year, viz., until September 12, 1862. She was now confined to bed. She could not stand, but moved all her limbs when pinched. Pinching was the only practicable way of getting her to do it, as to have told her by the blind book would have been difficult and tedious. She had had more of the attacks described at the last date. The mother's description of these fits was always vague. Now she said the eyes are turned out in the "fits," and that the *left* arm and leg were affected, and also the neck on the same side. She became insensible in these attacks.

She died August 21, 1863.

At the autopsy I found that the cerebellum was quite healthy, but there was disease in the cerebellar fossa of the skull. There was an irregularly modulated tumour, the size of a nut, about the junction of the pons and medulla oblongata, on the left side. It soon fell off, and before I had noted its precise connections; I am, therefore, uncertain as to the part it grew from, but it was at first connected by a

nerve filament to the side of the pons or medulla, but whether that filament was a part of the seventh or eighth nerves I cannot tell. As to the portiones molles, I saw nothing of them. Of course they had been there, but my removal of the brain had not been careful enough, and being soft they had been brushed away. There was a tumour connected with the sella Turcica, especially on the left side. The optic nerves were very soft, and greyish in colour, and the commissure was much flattened. The nerves and optic tracts were soft all the way to the corpora quadrigemina.

On the surface of the left hemisphere, towards the back, the dura mater was thickened irregularly by small nodose tumours. The dura mater was attached to the hemisphere, which was softened, and in parts quite diffluent. I think the ventricles had not been opened, but the brain was so soft that in parts it gave way too quickly to enable me to determine this point. The bodies in the floor of the ventricles were very soft. I took the posterior lobe of the brain, containing the tumours growing from the attached dura mater, to Dr. Wilks. The tumour, which was the size of a pigeon's egg, extended chiefly into the posterior lobe. The pathology of this tumour is of the greatest interest. There were fibrous meshes containing cell growths, the latter very large and angular. There were also laminated capsules. Thus, remarks Dr. Wilks, the general appearances resembled those of epithelial cancer.

The record of this case, although bulky, is fragmentary. It was impossible to help this, as the case was followed up under great difficulties. It shows well that amaurosis, although a most prominent defect, ought to take no more than equal rank with minor symptoms, like anosmia, ageustia, and cophosis. The anosmia, with the ageustia, will be considered later in connexion with other cases, as these symptoms not very infrequently complicate amaurosis. The deafness, which is a more rare complication of amaurosis, can only be noticed incidentally.

Proptosis.

The proptosis is a symptom of great value. The varicosity of the veins about the eyeballs was so great that one surgeon wrote on the patient's hospital letter "varicocele of the orbit." In this case there was an obvious cause for the prominence, viz., the tumour at the sella Turcica. I have no note of any ophthalmoscopic examination when the disease of the optic nerves was in its earliest stage. Nor is the kind of atrophy sufficiently well described in my notes to enable me to say that it was of the variety which follows neuritis, although from the circumstances under which it occurred there can be little doubt of it. In Dr. Habershon's case also, in which a tumour was found at the base of the skull *post mortem*, there had been marked proptosis during life, and yet the retinal veins, when I examined the eyes, a few weeks before death, were not larger than they generally are after neuritis from disease of the hemisphere. In some cases of neuritis from brain disease, the cause of the intra-ocular changes may be pressure on the sinuses at the base of the skull, but in some of those related in this paper there can have been no such pressure—certainly no direct pressure.

This and Dr. Habershon's case are the only cases of cerebral disease with disease of the optic nerves that I have seen in which proptosis has been marked.

Deafness and Vomiting—Vomiting in Disease of the Medulla Oblongata.

It may be supposed that the vomiting in this case was due to irritation of the rootlets of the eighth nerve by the small tumour in their neighbourhood—the loss of sight, to the tumour at the sella Turcica—the headache, to the disease of the membranes. Admitting that there were, in this particular instance, three causes for these three symptoms, we must then carefully remember that in this respect the case

is a very exceptional one. It is quite certain that we get all three from one lesion, and a very local one, of the hemisphere. As the vomiting in this case was persistent for years, not passing off as it generally does when the acute intra-ocular changes are over, it may be that the irritation of the roots of the eighth nerve was especially to blame for it.

The deafness is also an important symptom. Complete deafness on each side (I mean deafness from disease of the auditory nerve or its centre) very rarely occurs in connection with other marked symptoms of disease of the nervous system. I must say, however, that I have even a more limited experience of this symptom than of amaurosis. At all events, in cases that come under my care at the Hospital for Epilepsy and Paralysis, deafness is rarely found. According to the physiological notions of the day, which charge the medulla oblongata with vomiting in cerebral disease, one would, *a priori*, expect to find vomiting with cerebral deafness, for Lockhart Clarke has shown that the auditory nucleus is actually continuous with the nucleus of the vagus. But, as a matter of fact (still speaking from my own experience only), vomiting is rare with deafness, and common with amaurosis. Indeed it is as great a mistake to suppose that the symptom *Vomiting is likely to be due to disease of, or even near to the medulla oblongata or its nerves,* as it is to suppose that amaurosis indicates that there is intra-cranial disease involving some part of the optic nervous system. Let me say here what I said of the amaurosis, that I am speaking of the chief disease—the organic disease, *par excellence*—and not of secondary changes. It may be that just as disease of the hemisphere is associated with changes in the optic nerves (seen by aid of the ophthalmoscope), so certain travelling changes of nutrition might be detected in the medulla oblongata by the microscope.

The pain in the head, too, may have been due to the disease of the dura mater, but we find intense headache in cases in which the membranes appear to be quite healthy. Most of the cases related in this paper illustrate this.

Amaurosis (No. 2) from Disease of the Hemispheres* of the Cerebrum.

Case IX.—*Sudden Giddiness, Vomiting, and Headache; subsequently Amaurosis; Death; Autopsy; Disease of the Middle Lobe of the Cerebrum on the left side.*

A man 32 years of age, was admitted an out-patient under my care, September 11, 1863. Seven weeks before, whilst at his duties as superintendent of workmen at the dock, he was *suddenly seized at* 10 *a.m.*, in the midst of a conversation, with giddiness, pain in the head, and vomiting. He died about eleven weeks from this attack. Now the only striking symptoms this patient had were severe pain in the head, vomiting, and amaurosis. The first two began on the day of the seizure, the amaurosis *three weeks later*. I did not, however, examine the eyes until September 30 (about the tenth week). Then the optic discs were much affected (acute stage No. 2). There was, of course, some confusion of mind, but he did not become incapable of intelligent and courteous conversation until at least two weeks before his death. There was no paralysis anywhere; in short there were but the three symptoms (vomiting, headache, and amaurosis), which (at least, so far as I know), only indicate severe cerebral disease, but do not point to where the

* See E. Lancereaux on "Amaurosis with Degeneration of the Optic Nerves, in Disease of the Hemispheres of the Brain." (Archives Gen. 1864, i, 47, 190.) This paper is of great interest and of extreme value to physicians. It is noticed at length in the "Ophthalmic Review," July, 1864, and from this notice I extract the following:—"The author considers these changes analogous to those produced by section of a nerve, the atropic process being caused by an interruption in the passage of the nervous fibres to the cells of the grey matter, and concludes that if his view is correct—(1). A certain part of the fibres of the optic nerves pass beyond the corpora geniculata, and tubercula quadrigemina to the hemispheres and cerebral convolutions. (2.) That the corpora geniculata and tubercula quadrigemina are not perfectly analogous to the ganglia on the posterior roots of the spinal nerves. (3.) That luminous impressions pass to the cerebral convolutions, and that it is in the latter parts that perception of light takes place.

disease is, nor to what it is.* The only disease found at the autopsy was a large effusion of blood in the left middle cerebral lobe, and a few small specks in the corpora quadrigemina. The corpora striata, optic thalami, &c., were quite free from disease, and thus the absence of paralysis is accounted for. It is to be much regretted that the brain was not more carefully examined. No aneurism was found, but it was not specially looked for. Still the case shows that the three symptoms may occur from disease of the middle lobe, as well as from disease of other parts. The case is interesting too, as showing the suddenness with which vomiting and headache may come on, and also, if the patient's account of this matter is to be trusted, that it requires time for the development of amaurosis from disease of this part of the hemisphere. It is quite certain that disease of the hemisphere does not give rise to amaurosis directly as disease of a certain region of the (left) hemisphere gives rise to loss of speech. The connection is no doubt secondary. The examination of the corpora quadrigemina was not careful enough to give its precise value. Probably the effusions of blood in it were analogous to those we find in the retina in neuritis. More careful examination might perhaps enable us to trace changes analogous to those in the retina along the whole course of the optic nerves, &c., to the principal disease in the hemisphere. My chief object now, however, is to give instances of the coincidence of amaurosis with disease of the hemisphere, and not to discuss the manner of the connection of the two events.

Case X.—*Sudden Attacks of Convulsive Seizures; Vomiting; Headache; Amaurosis; No local Paralysis; Death; Autopsy; Disease of the Right Cerebral Hemisphere.*

Emily D., aged 28, was admitted an in-patient of the Hospital for Epilepsy and Paralysis, under the care of my

* This case has already been reported (Med. Times and Gazette, Dec. 5, 1863).

colleague, Dr. Ramskill. I then, with his permission, took the following note, for which, and for many other opportunities of investigating important cases under his care, I now tender him my warmest thanks.

Very careful and detailed inquiries were made as to her general constitutional health from infancy to the date of her illness, and except measles, at the age of four or five years, and some throat affection at the age of 24, lasting a few days, she had had most perfect health. It was also definitely ascertained that she had not been subject to headaches of any kind until the illness for which she was admitted, and of which she died. Nor was anything elicited as to any hereditary tendency to consumption or syphilis. Her mother had marks of syphilis, but she received the taint from her husband after this patient's birth.

She began to be ill on March the 12th, 1863, and died October 21 of the same year. On March the 10th her sister was married, and her mother says that the patient was beginning to menstruate at the time, and also suffered a good deal from being unable for a long time to find an opportunity to pass water. She was very much fatigued on that day, and also got wet. But it is clear that on the night of March 11 she was apparently quite well, in good spirits, and her mother said she had "cooked a good dinner."

Her first symptom was a fit, of which the following description was obtained, "she was taken very suddenly, turned up her eyes, turned round and round, and fell, and was in the fit two or three hours." It seemed, on enquiry, that she had really a series of convulsive attacks during this time, and that at intervals she was sensible, but probably only partly so, as she then kissed and hugged her fellow-servants. Next day she was herself again, and she kept pretty well for about a week. During this time, about three days from the fit, she had vomiting. She made great efforts, and yet brought up very little, sometimes only a little mucus, when much it was dark green. Again she vomited, not only after eating, but at other times. The

vomiting was preceded by cold chills, pain in the head for a few minutes, severe enough to make her cry out, and then, when she had vomited, the pain seemed better.

At the end of about a week (as her mother supposed from loss of her situation), she again had fits. They occurred, from early on a Thursday to a Monday, every half-hour. They died away gradually. It was impossible to gather any precise description of these fits, but it will be well to note that the mother insisted most strenuously that they occurred at intervals of half-an-hour, not roughly, but exactly.

After this she kept in good general health for six weeks, except that she had a slight headache, and that she was now and then sick. Her appetite was good, her mind perfect, and what is good evidence of that, she was amiable and good tempered during this time. About the latter two weeks the sight of the left eye failed, and she had some intolerance of light, and used to turn down the gas.

Then two weeks after this period of six weeks, *i.e.*, nine from the first fit, she had a slight seizure, and then a strong one. From this time her mind gradually failed.

I examined the eyes by the ophthalmoscope a few weeks before death.

For about three times the diameter of the normal discs there was a general, rather raised hazy-looking circular patch, so that the position of the disc was only known to be here by observing that the veins converged to one point in its centre. The patch was greyish-white, with here and there spots of blood recently effused, and other irregularly scattered dots of a dark colour among the remains of blood. No arteries were to be seen, but the veins were very large and dark, and seemed, at parts, to be lost in the effusion (?) about the centre of the *ci-devant* disc; except the part described, the fundus seemed normal.

When admitted no local paralysis was observed anywhere, but she was universally weak. She was generally sitting in a chair, in the stooping, helpless-looking way that a rickety child does, taking no note of anything. The

blindness, and a slight deafness from infancy, which had not been worse since her illness, were the only local symptoms. She scarcely ever spoke, but she answered questions addressed to her.

The surface of the anterior lobe of the brain on the right side was unbroken, but its interior was quite broken up into an iron-grey creamy matter. The disease extended backwards into the hemisphere, but did not in any way affect the ventricle, or the bodies in its floor. How far back it extended I do not know, as I had no opportunity of examining the hemisphere. It was reported that there was, beyond the part I have described, a tumour consisting of nucleated fibres. I hazard the surmise that this growth was analogous to the blood membranes found in the arachnoid. The spinal cord and medulla oblongata, with the pons and corpora quadrigemina were sent to Mr. Kesteven for microscopical examination. They did not seem to be at all affected, but the spinal cord was the only part examined by the microscope, the other parts having been spoilt by an accident. The cord was examined throughout its length in thin sections, and was reported by Mr. Kesteven to be quite healthy.

The last two cases show, I think, what I have urged that, from the three severe symptoms, Headache, Vomiting, and Amaurosis (No. 2), we cannot fix the seat of the disease causing them, at least not with any exactness. The fact that there was no local paralysis in either of the cases would show that the motor tract was not extensively involved. The disease might thus be diagnosed to be in one of the hemispheres of the cerebrum or cerebellum, but it would be, I think, impossible to get further accuracy than this. In neither of these two cases did I make any inquiries as to the sense of smell, which is an important omission, especially in the first of them, in which the anterior lobe was involved. In cases in which there are other symptoms, we can get nearer to the seat of the disease. For instance, hemiplegia (*i.e.* the ordinary form of hemiplegia) would indicate it to be near some part of the motor tract. In the following case, the disease which

appeared to produce the blindness, was near the corpus striatum, and its position was diagnosed during life. When there is defect of speech with the hemiplegia we may get nearer still, but this is not a common combination. I have only known hemiplegia on the right side, with both amaurosis and defects of speech* five times, and in but one of these cases have I had an autopsy.

The Ophthalmoscope in Cases of Hemiplegia—In Loss of Speech, &c.

Besides illustrating several points in my general subject, the next case shows the importance of the ophthalmoscope to the physician. I hope I may be pardoned if in my anxiety to impress this—which is the chief object in this paper—I wander somewhat from the purely ophthalmic aspect of my subject. I think the ophthalmoscope is at least quite as necessary in unravelling the complex symptoms of diseases of the nervous system as the stethoscope is in the diagnosis of diseases of the lungs.

We meet with cases in which it is impossible to get any information as to our patient's eyesight in any other way than by looking into his eyes. This is so when a patient is brought to the hospital comatose, without friends to tell us anything about him. When the patient has lost speech it is then also impossible, without an ophthalmoscopic examination, to know whether the optic nerves may not be a little affected—affected perhaps too little to totally incapacitate the patient, but enough to furnish us with a valuable symptom.

I make it a rule in every case of hemiplegia to examine the eyes with the ophthalmoscope. I do this chiefly to see if the patient has the retinal degeneration of Bright's disease.

* By defects of speech, I here mean the kinds of defects in talking which occur with hemiplegia, and in my experience nearly invariably with hemiplegia on the right side. These defects, as I have tried to point out (Lancet, Nov. 26, 1864), vary in degree from loss of power of language to little more apparently than an ataxy of articulation, although in all, the general faculty of expression is somewhat damaged.

Thanks to the generosity of my senior colleagues, Dr. Fraser, Dr. Davies, and Dr. Parker, I have many opportunities of doing this in urgent cases admitted into The London Hospital. I must also tender my most grateful thanks to my friend Dr. Woodman for his valuable assistance in the investigation of the following and many other cases of disease of the nervous system.

There were in Harrison's ward, a few weeks ago, three patients with hemiplegia and albuminuria, but without dropsy. In one of them, a man aged 47, there were no retinal changes. I wish particularly to draw attention to the fact that this patient had had two attacks of hemiplegia on the left side, viz., one four years and one five weeks before I saw him.

Case XI.—*Hemiplegia with Bright's disease and Hypertrophy of the left Ventricle—Retinal Degeneration, but no signs of acute disease of the Optic Nerve—Death two months later—Autopsy—Clot outside the right lateral Ventricle.*

In another, J. K., aged 40, the retina was studded in many parts with white brilliant dots. The optic disc was dull red and ill-defined, but the patient's sight was, he considered, quite good. His urine was albuminous. He was rapidly recovering the use of his arm and leg when he was attacked with symptoms of uræmic poisoning, and died in a week. This patient, like the last, was paralysed on the left; both could talk well in every sense of the word "talk." Dr. Woodman and Mr. Adams (jun.) made the autopsy. They found a large clot in the right hemisphere; the clot extended the whole length of the lateral ventricle. It involved the corpus striatum somewhat, but did not affect the intra-ventricular portion of it. The kidneys were granular, and there was hypertrophy of the left ventricle of the heart. In this case the disease had existed from the sudden attack, on February 20, to the patient's death, April 21. I examined the eyes one week before death, and then the

patient could read large newspaper type, and his retinæ presented the appearances they did on Feb. 21st.

Case XII.—*Hemiplegia on the Right Side, with Defect of Speech; Five months later Amaurosis; six months afterwards death from Apoplexy.*

The third patient, and this is the case chiefly in point, a man 46 years of age, was admitted completely comatose. His urine was albuminous. Whilst comatose, I examined his eyes, and found the optic discs badly margined, and dirty white. I could find no arteries, and the veins were partly obscured in the disc. There were no extravasations of blood about it. It was evidently old, and was in the condition I have often seen after the acute stage of No. 2, and was very like the disc in the boy's case (Case 3), as noted March 23. There was no evidence that I could find of retinal degeneration, like what we see in Bright's disease. It was very different to the retina in Case 11; there was certainly nothing notable. Yet this patient's urine also contained albumen. Had he died early, without this examination, and he seemed near death when I examined his eyes (which was but a part of routine, as the pupils were normal, and there was of course no evidence of defect of sight), we should, as we shall see, have lost a very important fact, bearing on the relation of this form of amaurosis to disease of a certain part of the left hemisphere. More than this, it so happened that, as the coma cleared away, the right side was found to be paralysed, and the patient did not speak more than a few words. He would never speak to me, but I was told that he once said, "Take me home," and one morning he answered several questions to Dr. Woodman. The hemiplegia was of the common form.

He was admitted March 14, and died March 25th. In this case the same parts and more were involved, as in the last case (except that the left was the side of the brain affected). Moreover it was clear that the patient had had a previous attack of apoplexy. There was a space the size of

a walnut, which evidently was a so-called cyst, from a previous apoplectic effusion. Its free boundary was on a plane with the anterior cornu of the lateral ventricle. Its hinder boundary was not defined as the new clot had burst into it.

Now I give the history I obtained from this patient's friends. There were three events :—

1st. Hemiplegia on the right side, with defect of speech 18 months ago.

2nd. Defect of sight 12 months ago.

3rd. Hemiplegia and coma, the immediate forerunners of death.

These of course were the prominent events. His kidneys, heart, and arteries had been slowly degenerating years before. The effusions of blood were, comparatively speaking accidents, as besides the disease in the brain, we found that the kidneys were granular and small; the left ventricle of the heart was greatly hypertrophied, and the cerebral blood-vessels were much diseased.

(1). One morning, 18 months before death, at 6 a.m., he went out to work, and got a cup of coffee in the street. He was suddenly seized with paralysis on the right side. He had difficulty in getting home, and then could not speak, and was not able to do so for several days. Indeed ever after this attack he had not been able to talk plainly. In about seven weeks his paralysis* was gone, and he went to sea again.

(2). Most fortunately this patient attended my colleague, Mr. Hutchinson, for his defect of sight, and therefore I am

* It is worthy of careful attention that the patient had told his wife that when the attack began "he was all of a light." "The street went as if on fire with his eyes."

There is now, May 10, in The London Hospital, under the care of my colleague, Dr. Fraser, a woman sixty years of age who is hemiplegic on the left side. She found herself paralysed one morning (April 11) on trying to get up. She tells me, that fourteen days *before* the hemiplegia, she had an attack of giddiness and all sorts of colours, "balls of fire," for half an hour. During the *last* fourteen days she has had six attacks of this kind, with giddiness and pains at the vertex.

able to give the following details of his condition then. I say fortunately, as, however certain I may be that a patient may have had disease of the optic nervous system, and still read and go about his work, I think it very likely that many medical men would think it scarcely possible that this patient could have had any discoverable (*i.e.*, visible by the ophthalmoscope) disease of his optic nerves, when I state that he had just returned from a voyage to Scotland as a common sailor. Indeed when the attack came on he was aloft, and becoming giddy, was lashed to the mast, or to some part of the rigging, by a comrade. However well he could manage to see, it is quite certain that he had a certain form of disease of his optic nerves. Most unfortunately in Mr. Hutchinson's case-book, from which I extract the following notes, the ophthalmoscopic examination had not been entered.

"February, 1864.—He says that until a month ago, he could see as well as any man. He then noticed a sort of dimness. It advanced rather rapidly, but quite by degrees. He states that often, for a very short time, he is able to see much better, then again his sight leaves him. He has several times fallen off planks, owing to his feeble sight. Sometimes his sight goes away for a minute or two, so that he cannot see at all, and is obliged to stand still and wait. If he holds his head down he is worse, and after stooping a while his eyes get quite dark. For about eighteen months he has been liable to severe headaches. These were quite new to him. The pain was worse at night, almost every night; sometimes all day too. The pain was extreme, such that he thought he should lose his senses. Took much medicine, but not at a hospital. For three or four months has had but little headache. He has also had much pain in his left tibia, and there is a decided enlargement on its inner edge very hard. He says that at times he has had swellings on the skull. As to venereal disease, he states that he had "chancres and running" at the age of 19, and was treated by pills for about a month. He does not recollect any

secondary rash, and had thought himself quite well. Married 14 years; no family."

(3). The fatal attack which I have just described.

Now as to the explanation of these three events. Of course the third event was due to the recent extravasation, and needs no comment. The first attack was due to the clot which was at the autopsy represented by a cyst. The middle event, the amaurosis, is the one which presents a difficulty.

The patient's observation as to the temporary affection of vision at the time of the first effusion of blood is most interesting when taken in conjunction with the failure of sight some months later. It is certainly not a usual symptom in apoplexy, producing hemiplegia, but is not very rare as an "aura" in certain cases of chronic epileptiform convulsions, which can I believe be shown to be due to disease of the hemisphere. I think it most probable that the amaurosis was due to secondary changes in the optic nervous system, consequent on irritation of the first clot. It is quite clear that the hemisphere may be diseased without defect of sight. But it is equally clear that sight is often affected from disease of this part of the brain, even when at great distance from the optic tract. Lanceraux thinks the connection may be explained by supposing that fibres of the optic nerves pass to many parts of the hemisphere. Again, it may be put down to reflex irritation.

The first patient, although he had had an attack of hemiplegia four years before, doubtless from a clot; had no defect of sight, and no ophthalmoscopic changes. Indeed hemiplegia is very common, but hemiplegia with double amaurosis is rare. In the same way hemiplegia (in the right side) is very common, but is rare with loss of speech. The reason in the latter case is clearly this, viz., that when the disease, say clot, is confined to the corpus striatum there is paralysis only, when it involves certain neighbouring convolutions as well, there is loss or defect of speech as well. In the same way, I imagine amaurosis does not follow if the lesion be confined to the motor tract.

Now, defect of speech nearly invariably (*i. e.* in my experience) comes on at the same time as the hemiplegia, whereas amaurosis complicaing hemiplegia never does. So then we have two defects each due to disease of the hemisphere, which we can compare and contrast. Loss of speech, coming on at once, shows that the faculty of speech resides in the part damaged. Amaurosis, requiring time for its development, shows that cerebral vision does not reside in any particular part of the hemisphere. This is well illustrated by Case 12, in which a clot first damaged power of speech, and then was followed by amaurosis. Then Cases, 9 and 10, show also that disease of other parts of the hemisphere may produce, in time, amaurosis.

There are certain other points in connection with the subject which I shall resume after relating more cases. And here again I take the opportunity of drawing attention to certain difficulties in the study of cerebral amaurosis.

"Uncomplicated" Amaurosis frequently, but the remaining symptom of a series of Nervous Symptoms.

The difficulty of keeping a patient for a long time under observation in London is very great. The patient, when his symptoms are the same, goes from one general hospital to another. When, although from the same or similar pathological changes, the symptoms vary, he goes to hospitals for different diseases one after another.

Let me illustrate by Case 2. Had I not called at this boy's home and engaged the courteous interest of Dr. Swyer, I should have lost the most interesting part of his history, viz., that he got well (*i. e.*, as regards life) after symptoms of such evil import. I am certain that otherwise I should have seen nothing more of him. His mother would have taken him to an ophthalmic hospital, and probably yet he will go the round of the various ophthalmic hospitals in London. Now, I fear, his case is too late for any rational treatment, as the changes in the optic nerves have passed beyond the

acute stage, and are settling down into a permanent one of atrophy. Just as it is important to treat iritis before the lymph has had time to fix itself, so I suppose if any treatment is to be of use in amaurosis it should be adopted when the disease of the optic nerve is in the early stage.*

It thus happens that both the physician and the ophthalmic surgeon not infrequently see but parts of the whole disease. It follows, therefore, that our knowledge of the causes and relations of amaurosis is not only limited but confused. We have crowds of isolated facts and yet few complete observations. A patient who attends at an ophthalmic hospital leaves for a general hospital, when he becomes paralysed or subject to epileptiform convulsions. The converse—a patient who is paralysed leaves the physician when his sight becomes impaired. This tends to confound our studies of amaurosis more than appears at a first glance. It is not merely that the physician may not note carefully the changes in the eye, or that the ophthalmic surgeon may not study the attendant paralysis or convulsions, but too often the symptoms have changed, and, moreover, we may not be able to obtain a satisfactory history from the patient. Just as the paralysis in cases of hemiplegia, with loss of speech, sometimes passes off and leaves the patient simply speechless, so in the same way the hemiplegia which has complicated double amaurosis sometimes disappears and leaves the patient with no other symptom than the amaurosis. No one can deny that it is a most unfortunate circumstance when the patient tells

* I confess I know of no treatment for amaurosis, even in the early stage, beyond what good may be done in treating the general cerebral disease. The local disease is generally old and of itself may be of comparatively little import. We know that a patient may live in good health, and even in apparent intellectual health, who has damage of part of one hemisphere. But when the local disease sets up a disturbance in its neighbourhood, danger to other parts of the nervous system, more important to life, may occur. We may, however, hope by treatment if not to remove the local disease, at least to prevent, remove, or to arrest the secondary changes it induces.

us nothing of a symptom so important and so very valuable in diagnosis as hemiplegia.

The following case illustrates the above remarks. During the hemiplegia, and at the time when the blindness was, so to speak, being produced, the patient was only partly conscious; he could be roused for a time only. Yet by my friend Mr. Leach's energetic and yet precise treatment, he got apparently quite well, except for the amaurosis. Had he then (before the relapse which ended in death), gone to an ophthalmic hospital, the surgeon could have obtained no history of the hemiplegia from him to point to disease of one of the hemispheres. He would have been able to gather that the patient had had "bilious" or "brain fever," a kind of information so likely to be given after so many kinds of intracranial disease, with and without amaurosis, that although of much general importance, it would (as I have tried to point out), have had no particular value in unravelling the complexities of an individual case.

Of course there would have been a history of syphilis, as a guide to treatment; but, just now, I am speaking of the physiological history of amaurosis, and as regards this the hemiplegia was the one important symptom. Besides, the information as to syphilis would have been of no use so late, even if the disease of the optic nerves had depended directly on it, any more than it could have been for the treatment of a scar left by a syphilitic ulcer. Really, however, the amaurosis occurred, because the patient had *disease* of the hemisphere. The fact that that disease was syphilitic, although an important one, was not the most important, as exactly the same kind of amaurosis follows many other kinds of disease of the hemisphere.

Case XIII.—*Severe Cephalalgia—Urgent Vomiting—Anosmia—Amaurosis—Hemiplegia on the Left Side—Attacks of Convulsions of the Paralysed Muscles—Death—Autopsy—Syphilitic Disease of the Cranium—Syphilitic Deposit on the surface of the Right Hemisphere, involving several convolutions, including the third frontal—Softening of the Hemisphere.*

A man, 42 years of age, came under my care when attending for one of the physicians to the "Dreadnought." I saw him, April 5th, 1864, and gathered the following history from Mr. Leach, the resident medical officer.

[Here I take the opportunity of tendering my warmest thanks to Dr. Warde, Dr. Rooke, Mr. Bedford, and Mr. Leach, for such valuable help in studying cases of disease of the nervous system which have occurred in their practice.]

The patient had had syphilis four or five years ago, but his present series of symptoms began about November, 1863. He began to be ill by "shaking," and loss of power in the muscles of the face, and by partial loss of power in the limbs. He was confined to his berth for a month after this attack, and suffered chiefly with pain in the occiput, which has continued more or less since. He was then admitted into a Colonial Hospital, where he was profusely salivated. The above history is necessarily meagre, but the patient could give no better.

He was admitted into the "Dreadnought," February 13, 1864, and then had but three symptoms, intense pain in the head, vomiting, and constipation. Mr. Leach diagnosed syphilis as being at the bottom of the mischief, and as will appear in the sequel, he was right. He gave iodide of potassium. The pain and vomiting continued, and the greatest difficulty was experienced in getting the bowels open. Croton oil and injections were had recourse to, however, with effect.

On the 21st, the above symptoms continuing, paralytic symptoms were noticed for the first time, viz., slight paralysis of the face and tongue on the left side, and on the next day it was found that the left arm was weak, and on the 23rd the

leg was affected, too—there was, in fact, decided hemiplegia on the left side.

There is no further note until March 30, when Mr. Leach writes:—

"Bowels relieved last night, breathing stertorous at intervals; constantly drowsy, and takes very little food. Left pupil permanently smaller than the right. [As he had paralysis of the third nerve on the right side, it would perhaps be better to put that the right was larger. But this is to anticipate.] Urine very small in quantity.

31.—"Almost comatose. Takes no fluid food. Left pupil insensible to light. Right pupil much dilated."

April 1.—"He recovered a little during yesterday and to-day; takes drink tolerably well, and is conscious. Both pupils are now affected by light. Bowels confined."

April 2.—"Right eyelid dropped to-day, and there is less paralysis of the left side of the mouth."

April 4.—"During the last two days complete blindness of both eyes has come on. He is now almost constantly incoherent. He has regained some amount of power in the left arm and hand. Partial paralysis of bladder."

On April 5th I saw him. There was then hemiplegia on the left side, the face being but slightly affected. There was also paralysis of the third nerve on the *right* side, except that the pupil was moderate in size. Both pupils were now equal. Atropine was dropped in the eyes, and the discs were readily caught, or rather the patch that obscured them. The appearances, the same in each eye, were these: The veins were gorged, and the arteries were not to be found. The veins were now and then obscured in their way to meet at the centre of a whitish, hazy patch, about three times the size of the disc. I could see no extravasations of blood. He was totally blind.

On April 13 Mr. Leach examined as to his sense of smell. It was lost.

I again saw the patient on April 14, and in conjunction

with Mr. Leach, I made the following notes on the hospital ticket.

He complains of pain in the right infra-orbital region and also of "face-ache." There is no paralysis of the face (I mean of the muscles supplied by the portio-dura), except in the part usually affected in the ordinary form of hemiplegia.

He talks well, as to speech, voice, and articulation, his voice being strong, clear, and his sentences coherent, though he is rather below par in mind. "You see my dear sir, I can't bear the pain. What am I to do?" He says he does not smell assafœtida on either side. He remembers smelling ammonia yesterday, and spontaneously alludes to it, and goes on talking about it. He is very loquacious. The feeling of the left arm is good. He feels a gentle touch on both cheeks. In quiet breathing the chest moves well on both sides. When raised up he supports his head. The abdomen is much retracted.

I note the above in detail, to show that the hemiplegia was of the ordinary form. I mention his remarks as to the ammonia, to show that he really did try to smell the assafœtida, and that he answered carefully.

Now we come to other physiological symptoms of great interest, viz., convulsive attacks of the limbs paralysed.

April 19.—This morning, about 8.30, while talking to the nurse, he was suddenly seized with "a fit." The arm and leg on the *left* side were for about half a minute violently extended to their utmost extent. Flexion followed slowly, and the limbs regained their usual position. He was in a state almost approaching coma for about an hour after this, but in the afternoon became quite sensible.

He gradually improved under Mr. Leach's treatment for syphilis, and when I saw him again, May 29, he was, except for his blindness, well so far as he knew. He was up and about, and had no paralysis anywhere. He was quite blind. The optic discs looked quite white; they were raised and badly margined, seeming at their edges to smooth off into

the general fundus, yet they (or the whiteness) did not now occupy much more than the normal space. The veins were very small, the arteries were still not to be found.

On June 3 there was slight ptyalism, from biniodide of mercury, which had been administered.

On the 5th he had another attack, which Mr. Leach describes as follows :—

"At 9.30 p.m., convulsive movements commenced in the left side of the face, with dragging of the left angle of the mouth, snatchings of the left arm and hand. The left leg was drawn up once or twice, and he said he felt in both these limbs as if the blood was running along them rapidly. In about eight minutes the limbs were quiet, but the twitchings of the face lasted about 45 minutes altogether. After this attack the pain in the head was intense, and continued so more or less all day. At 11 p.m., he was quiet, and inclined to sleep, but the left arm and leg were weaker."

After this he had but a few "twitchings" of the left side.

He died August 7, 1864. For about three weeks before death he lapsed into a state of occasional delirium, recalling past events, speaking of his home, &c. I saw him two days before his death, and then he knew my voice, and said, in a clear tone, "Is that you, Dr. Jackson?"

The autopsy was performed by Mr. Leach. The following were the chief morbid appearances:—The right lung was healthy. The left lung was adherent to the chest walls by recent pleuritic adhesions. Tubercles and small vomicæ were scattered throughout its entire substance.

The brain—the left hemisphere was quite healthy. The greater part of the right was softened. The third nerve on the right looked like its fellow, but the crus from which it arose was soft, but at the same time (the preparation having been some time in spirit when I examined it) the opposite crus was nearly as soft. The most marked change, however, was local. There was on the surface, a mass of yellowish, tough deposit, fastening down the dura-mater firmly to the convolutions. Above, in connection with this, the cranium

was diseased, and slightly honeycombed. The mass extended into the brain, about as deep as the grey matter. The posterior two thirds of the third right frontal convolution, part of the second frontal, the transverse, and part of several of the parietal convolutions were involved.

(To be continued.)

A CASE OF CHRONIC GLAUCOMA WITH SOME PECULIAR FEATURES.

By Jonathan Hutchinson, F.R.C.S.

Surgeon to the London Hospital, and Assistant-Surgeon to the Moorfields Ophthalmic Hospital.

Irides congenitally of different colours—Chronic painless—Glaucoma of one Eye ending in deep Cupping of the Disc, and Bulging of the Sclerotic above the Cornea—Iridectomy—Disappearance of the Anterior Staphyloma, but no benefit to sight—Report of state two years and a half after the operation.

The following case presents several features of interest. We have a perfectly healthy man attacked by insidious and quite painless disease of one globe, resulting in the increase of its contents so as to cause deep cupping of the disc, and even staphyloma in front. For six months he is treated by the old plan: he is salivated, but it does nothing to arrest the process. Finally, when too late to benefit the sight, iridectomy is performed, and it entirely prevents any further progress of the previously increasing staphyloma. Our narration extends over more than two years subsequent to the operation, and we find no tendency to implication of the other eye in similar disease. Lastly, we have the fact that the two eyes appeared to have presented from birth some slight difference in structure, the irides being remarkably different in colour. This asymmetry as to colour of iris is not infrequent, and is probably of little consequence, but it is worthy to be kept in mind when we meet with unsymmetrical disease of the globes without apparent cause.

Benjamin B——, aged 36, a stout, florid man, a hawker, from Cornwall, accustomed to live well, short, and of dark complexion.

He came to me October 21, 1862, having then had his right eye rather weak for about six months. For only three months had there been any material loss of sight. He had been salivated for it by a surgeon in Devonshire. He had had no pain whatever in the eyeball, and there was no history of injury. His other eye

(the left) was still perfect. His irides were of different colours from birth, the left being a rich brown, the right a dark grey. Whilst the eye was failing he had perfect health, a good appetite, and no pain.

He could, with the right eye, see nothing but shadows, and could not count fingers. On the outer and upper part of the sclerotic, a quarter of an inch from the corneal edge, was a large even bulging of the sclerotic, of bluish colour. This was wholly concealed under the upper lid. With the ophthalmoscope we could find no internal growth, whilst it was certain that there was deep cupping of the right optic disc. The cornea was clear; sclerotic somewhat congested. The globe was of slightly increased tension. On October 28 I excised a large portion of iris upwards and outwards. The excision quickly healed, and he left the hospital.

December 15.—He has derived no benefit from the operation, excepting that the congestion has diminished, and the staphyloma has not increased. He can see nothing except shadows. The optic disc is cupped, the arteries are very small, and the veins smaller than natural. The disc is whitish, and abruptly margined. Choroidal pigment abundant. In the other eye the disc is normal.

August 14, 1863.—The sight of the right eye has not improved at all. He can only just tell the end of the room where the windows are. The sight of the left eye has not failed at all. He can see well in the distance, and can read as well as ever. I find that he can read No. 1 readily and quickly. The optic disc is brilliantly white, and much cupped. His health is, he says, quite good, and he looks very healthy indeed. He complains of a little lachrymation.

January 4th, 1865.—He comes to report:

He can read brilliant with the left eye at two feet, or at one foot, not at nine inches. He has no misty days, but sometimes a little feeling of coldness about the eye. The disc of this eye is quite normal. The globe feels a shade too firm.

The right eye shows a splendid cup, deepest at the apparent lower part, of a glistening grey-white appearance; veins of fair size, and dark; arteries very small indeed. He cannot distinguish light from dark, or only just. The globe is rather firmer than natural.

He complains that the lost eye is often watery.

He is stout and florid, and in excellent health.

NOTE OF A CASE OF GLAUCOMA IN WHICH THE APPLICATION OF ATROPINE RESTORED TEMPORARILY THE TRANSLUCENCY OF THE DIOPTRIC MEDIA.

Reported by Mr. Spencer Watson, F.R.C.S., Eng., Assistant-Surgeon, King's College Hospital, &c.

The subject of the following observation was a woman, 40 years of age, who applied at Moorfields in November, 1864, with sub-acute glaucoma in the right eye. On attempting to examine the fundus ophthalmoscopically the media were found to be too turbid to allow of any view of the retina, and the same turbidity remained even after the dilatation of the pupil with atropine. But on making a further examination, when the pupil had become fully dilated, it was observed that the whole of the transparent media had cleared perfectly, and the state of the retina and optic nerve could be very closely observed. This change occurred within fifteen or twenty minutes, and was not accompanied by any improvement of vision. When she presented herself, three days after, the turbidity had returned. Iridectomy was subsequently performed with a successful result. The facts as to the non-translucency of the dioptric media before the use of atropine, and their change afterwards, were substantiated by several different observers.

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